



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

FORESTRY

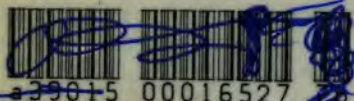
SD

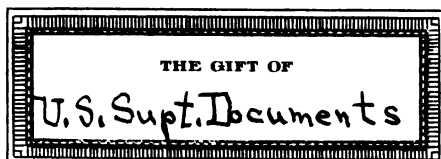
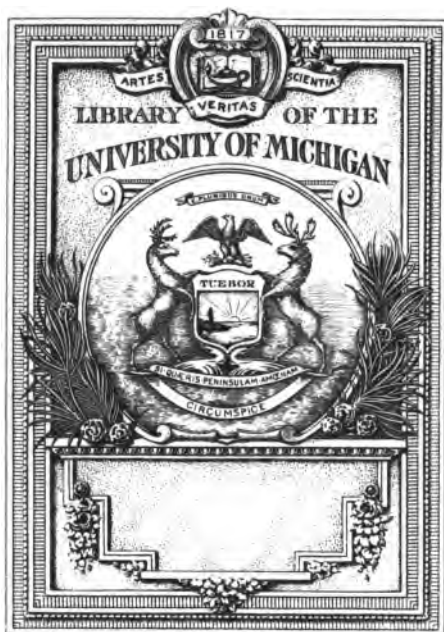
11

A9

no. 3

BUHR B





BULLETIN No. 3.

U. S. DEPARTMENT OF AGRICULTURE.

DIVISION OF AGROSTOLOGY.

GRASS AND FORAGE PLANT INVESTIGATIONS.

210

USEFUL AND ORNAMENTAL GRASSES.

BY

F. LAMSON-SCRIBNER,
AGROSTOLOGIST.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1896.



Forestry

SD

11

. A9

644
7.5. Sept. 19 Dec.
17/4/30

LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF AGROSTOLOGY,
Washington, D. C., July 15, 1896.

SIR: I submit herewith for publication as a bulletin of this Division an enumeration of the true grasses useful for food, for hay, for pastures, for lawns, for ornament, for paper making, etc., both of this and other countries. The different kinds are arranged in alphabetical order by the initial letter of their Latin names. There is appended a list of the common or local English names of all the grasses enumerated, so far as I have been able to obtain them. These English names are arranged alphabetically, the Latin equivalent being given in each case, under which the grass is described. There is much confusion in the use of English names for grasses. Many of these names are purely local, and oftentimes the same grass is known in one locality by one name and in another section by another. In parts of the South "blue grass" is applied to any native pasture grass which has a good, luxuriant growth and is readily eaten by stock. It is most commonly applied, however, to *Poa pratensis*, or "Kentucky blue grass." This grass is called "green grass" by some in Pennsylvania, and "spear grass" or "June grass" by many in New England. In Australia "blue grass" is applied to a species of *Andropogon*. In the West and in the Rocky Mountain region we have the names "bunch grass" and "buffalo grass," each applied indiscriminately to several species. The term "bunch grass" is applied to a great number of kinds which grow in bunches and do not make a continuous sod. In Montana the name "buffalo grass" is applied to *Bouteloua oligostachya*, and in Australia *Stenotaphrum americanum* is called "buffalo grass." In the Southwest the several species of *Bouteloua* are called grama. This term is also applied to other grasses, being somewhat generic in character and employed to designate any good grazing grass which becomes gray with age. Very many of the species of grasses of the Northwest which are of undoubted agricultural value have received no popular English names, and I have not included them in this enumeration. There are many species of *Agrostis*, of *Festuca*, and particularly of *Poa*, growing

wild upon the Pacific Slope of the Northwest or in the Rocky Mountain region which are doubtless as valuable for grazing or for hay as any of the species I have included, but our present information regarding them is rather botanical than economic, the observers or collectors being more given to science than to agriculture, so that I have omitted them, awaiting more definite information respecting their economic value and agricultural merit, either in their natural growth or under cultivation. These grasses, and others which may have been overlooked, can be included in a future edition, should such a publication be deemed desirable.

Respectfully,

F. LAMSON-SCRIBNER,
Chief of Division of Agrostology.

Hon. CHAS. W. DABNEY, Jr.,
Assistant Secretary of Agriculture.

ILLUSTRATIONS.

	Page
Fig. 1. <i>Agropyron repens</i>	12
2. <i>Agrostis alba</i>	12
3. <i>Alopecurus geniculatus</i>	14
4. <i>Alopecurus pratensis</i>	15
5. <i>Ammophila arenaria</i>	16
6. <i>Andropogon halepensis</i>	17
7. <i>Andropogon nutans</i>	18
8. <i>Andropogon provincialis</i>	19
9. <i>Andropogon scoparius</i>	20
10. <i>Andropogon virginicus</i>	21
11. <i>Anthoxanthum odoratum</i>	22
12. <i>Aristida purpurea</i>	23
13. <i>Arrhenatherum elatius</i>	23
14. <i>Arundinaria</i>	24
15. <i>Avena fatua</i>	26
16. <i>Beckmannia erucæformis</i>	28
17. <i>Bouteloua hirsuta</i>	29
18. <i>Bouteloua oligostachya</i>	29
19. <i>Bouteloua racemosa</i>	29
20. <i>Briza media</i>	30
21. <i>Bromus inermis</i>	31
22. <i>Bromus secalinus</i>	32
23. <i>Bromus unioloides</i>	32
24. <i>Buchloë dactyloides</i>	33
25. <i>Calamagrostis canadensis</i>	33
26. <i>Calamovilfa longifolia</i>	34
27. <i>Cenchrus tribuloides</i>	35
28. <i>Chloris glauca</i>	35
29. <i>Ctenium americanum</i>	37
30. <i>Cynodon dactylon</i>	37
31. <i>Cynosurus cristatus</i>	38
32. <i>Dactylis glomerata</i>	38
33. <i>Dactyloctenium ægyptiacum</i>	39
34. <i>Danthonia spicata</i>	41
35. <i>Deschampsia flexuosa</i>	41
36. <i>Distichlis maritima</i>	42
37. <i>Elessine indica</i>	42
38. <i>Elymus arenarius</i>	43
39. <i>Elymus virginicus</i>	44
40. <i>Epicampes rigens</i>	45
41. <i>Eragrostis major</i>	46
42. <i>Festuca elatior</i> var. <i>arundinacea</i>	48
43. <i>Festuca rubra</i> var. <i>glaucescens</i>	49
44. <i>Festuca scabrella</i>	50
45. <i>Glyceria canadensis</i>	51

	Page.
Fig. 46. <i>Glyceria fluitans</i>	51
47. <i>Glyceria nervata</i>	52
48. <i>Hierochloa odorata</i>	53
49. <i>Hilaria rigida</i>	53
50. <i>Holcus lanatus</i>	55
51. <i>Hordeum jubatum</i>	55
52. <i>Leersia virginica</i>	57
53. <i>Lolium perenne</i>	59
54. <i>Lolium temulentum</i>	59
55. <i>Muhlenbergia diffusa</i>	61
56. <i>Muhlenbergia glomerata</i>	61
57. <i>Muhlenbergia mexicana</i>	61
58. <i>Oryzopsis membranacea</i>	63
59. <i>Panicum agrostoides</i>	64
60. <i>Panicum amarum</i>	64
61. <i>Panicum crus-galli</i>	66
62. <i>Panicum jumentorum</i>	66
63. <i>Panicum sanguinale</i>	69
64. <i>Panicum serotinum</i>	70
65. <i>Panicum texanum</i>	70
66. <i>Panicum virgatum</i>	71
67. <i>Paspalum distichum</i>	72
68. <i>Paspalum laeve</i>	72
69. <i>Paspalum platycaule</i>	73
70. <i>Phalaris canariensis</i>	75
71. <i>Phalaris caroliniana</i>	76
72. <i>Phleum pratense</i> ✓	76
73. <i>Poa buckleyana</i>	79
74. <i>Poa pratensis</i> ✓	81
75. <i>Redfieldia flexuosa</i>	81
76. <i>Setaria germanica</i>	83
77. <i>Setaria glauca</i> ✓	83
78. <i>Setaria italica</i>	83
79. <i>Spartina cynosuroides</i>	85
80. <i>Spartina juncea</i>	85
81. <i>Spartina stricta</i>	86
82. <i>Sporobolus airoides</i>	87
83. <i>Sporobolus indicus</i>	87
84. <i>Sporobolus wrightii</i>	88
85. <i>Stenotaphrum americanum</i>	89
86. <i>Stipa viridula</i>	91
87. <i>Tripsacum dactyloides</i>	93
88. <i>Uniola latifolia</i>	93
89. <i>Zizania aquatica</i>	95

INTRODUCTION.

There are nearly 4,000 distinct species of grasses distributed throughout the world, and 1,400, or one-third of the entire number, are natives of North America. North of Mexico there are over 700 species, with more than 100 varieties. Six hundred and fifty species have been collected in Mexico alone. These grasses are not all equally useful. Some of them appear to be worthless, and a number are harmful to agriculture by possessing the character of weeds or by yielding injurious products. Some of them have a very restricted range and are found but rarely. A few are limited to the Arctic zone, or are confined to the highest mountain tops near the limits of perpetual snow; others grow only within the tropics, while still others are found in temperate climates. Some grow in the sands along the seacoasts, some flourish only in moist meadows, and others exist in the most arid deserts; some grow in the shadows of forests, others thrive only upon open plains; some are confined to soils heavily charged with lime, others make vigorous growth where practically no lime exists. It is with all the varied peculiarities of grasses—their individual characteristics, the soils and surroundings best suited to their growth, their productiveness and palatability—that one must become familiar in order to direct his efforts intelligently in the improvement of the forage and grazing resources of the country, the prime feature of interest that the farmer has in the subject.

In the following pages an attempt is made to point out the more important grasses, briefly stating their characters and qualities. It may be helpful to present here a list of these, classified according to their uses:

Narcotic or poisonous.—*Lolium temulentum*; * *Panicum antidotale* (India); *Paspalum scrobiculatum* (India); *Stipa viridula*.

Medicine.—*Agropyron repens*; *Andropogon iwarancusa*; *A. laniger*; *A. nardus*; *A. schoenanthus*; *A. squarrosus*; *Arundo donax*; *Coix lachryma*; *Dactyloctenium ægyptiacum*; *Eragrostis cynosuroides*; *Gynenium argenteum*; *Hilaria cenchroides*; *Panicum antidotale* (India); *Paspalum notatum*; *Thysanolanæa acarifera*.

Distilled and malt liquors.—*Avena sativa* (Russia); *Hordeum sativum*; *Oryza sativa*; *Saccharum officinarum*; *Secale cereale*; *Zea mays*.

* See *Lolium temulentum* under *Lolium* in body of work.

For lawns.—*Agrostis canina*; *A. stolonifera*; *Alopecurus geniculatus*; *Buchloë dactyloides*; *Chloris verticillata* (Southwest); *Cynodon dactylon* (in the South); *Cynosurus cristatus*; *Festuca heterophylla*; *Opizia stolonifera* (Mexico); *Paspalum platycaule* (South); *Poa compressa*; *P. pratensis*; *P. nemoralis*; *Stenotaphrum americanum* (South); *Thuarea sarmentosa* (in the tropics); *Zoysia pungens*.

Hay.—*Agropyron divergens*; *A. spicatum* (in the West); *Agrostis alba*; *Alopecurus pratensis*; *Andropogon bombycinus* (Australia); *A. halepensis* (South); *A. nutans* (West); *A. provincialis* (West); *Anthistiria avenacea* (Australia); *Arrhenatherum elatius*; *Astrebla pectinata* (Australia); *Avena sativa* (Pacific Slope and South); *Bouteloua oligostachya* and *B. racemosa* (in the West); *Brachypodium japonicum* (Pacific Coast and South); *Bromus inermis* (South and West); *B. pumpellianus* (Northwest); *B. unioloides* (South); *Calamagrostis canadensis* (Middle and Northern States); *Cynodon dactylon* (in the South); *Dactylis glomerata*; *Elymus condensatus* (Pacific Coast); *Eragrostis abyssinica* (South); *Festuca duriuscula*; *F. elatior*; *Hilaria rigida* (Southwest); *Koeleria cristata* (West); *Lolium italicum*; *L. perenne*; *Muhlenbergia distichophylla* (Southwest); *Oryzopsis membranacea*; *Panicum crus-galli*; *P. miliaceum*; *P. molle* (South); *P. proliferum*; *P. sanguinale* (South); *P. spectabile* (tropics); *P. texanum* (Southwest); *Pennisetum cenchroides* (in the Orient); *Phleum pratense*; *Poa nemoralis*; *Setaria italica*; *Sporobolus indicus* (Australia); *S. wrightii* (Southwest); *Tricholæna rosea* (Australia); *Trisetum pratense*.

Cereal grasses.—*Andropogon montanus* (India); *A. sorghum sativus*; *Arundinaria hookeriana* (India); *Astrebla pectinata* (Australia); *Avena sativa*; *Coix lachryma*; *Dactyloctenium ægyptiacum* (India and southern California); *Eleusine coracana* (the Orient); *Eragrostis abyssinica* (Africa); *Glyceria fluitans*; *Hordeum sativum*; *Ischæmum rugosum* (India); *Oryza sativa*; *Oryzopsis membranacea* (New Mexico); *Panicum colonum* (India); *P. crus-galli* (southern California); *P. flavidum* (India); *P. frumentaceum* (India); *P. miliaceum*; *P. sanguinale* (Bohemia); *P. turgidum* (Egypt); *Phalaris canariensis*; *Secale cereale*; *Setaria italica*; *Triticum polonicum*; *T. sativum*; *Zea mays*; *Zizania aquatica*.

Soiling.—*Andropogon sorghum sativus*; *Euchlæna mexicana* (South); *Panicum colonum* (tropics); *Pennisetum spicatum* (Southern States); *Saccharum officinarum*; *Zea mays*.

Fiber.—*Eragrostis cynosuroides*; *Ischæmum angustifolium*; *Saccharum ciliare*; *Stipa tenacissima*; *Lygeum spartum*; *Spartina cynosuroides*; several species of *Bamboo*.

Edible.—*Arundinaria wightiana* (India); *Bambusa*; *Zea mays*.

Desert grasses.—*Blepharidachne*; *Elionurus hirsutus* (northern India); *Hilaria cenchroides*; *H. jamesii*; *H. rigida*; *Triraphis mollis*.

Grasses for alkaline and saline soils.—*Distichlis maritima*; *Sporobolus airoides*; *S. asperifolius*; *S. orientalis*.

Ornamental grasses.—*Agrostis* *nebulosa*; *A. scabra*; *Aira elegans*; *Arundo donax*; *Asprella hystrix*; *Briza maxima*; *B. media*; *Chloris barbata*; *Coix lachryma*; *Desmazeria sicula*; *Eragrostis ciliaris*; *E. pectinacea*; *Erianthus ravennae*; *E. saccharoides*; *Festuca glauca*; *Gastridium australe*; *Glyceria canadensis*; *Gynerium argenteum*; *Lagurus ovatus*; *Lamarchia aurea*; *Miscanthus sinensis*; *Muhlenbergia capillaris*; *Oplismenus*; *Panicum plicatum*; *P. sulcatum*; *Papophorum laguroideum*; *Pennisetum japonicum*; *P. latifolium*; *P. violaceum*; *Stipa elegantissima*; *S. pennata*; *Trichloris blanchardiana*; *Tricholæna rosea*; *Triraphis mollis*; *Uniola latifolia*; *U. paniculata*.

Grasses used in paper-making.—*Arundinaria*; *Avena sativa*; *Bambusa*; *Calamovilfa longifolia*; *Danthonia flavescens* and *D. raoulii* (New Zealand); *Festuca littoralis*; *Gynerium argenteum*; *Ischæmum angustifolium*; *Lygeum spartum*; *Oryza sativa*; *Poa cæspitosa*; *Saccharum ciliare*; *S. officinarum*; *Secale cereale*; *Setaria viridis*; *Spartina cynosuroides*; *S. gracilis*; *Stipa tenacissima*; *Zea mays*.

Grasses for pastures.—*Agrostis alba*; *A. stolonifera*; *Andropogon affinis* (Australia); *A. saccharoides* (Chile); *Bouteloua oligostachya* and *B. racemosa* (in the West); *Buchloë dactyloides* (West); *Chloris verticillata* (Southwest); *Cynodon dactylon* (in the South); *Epicampes rigens* (Southwest); *Eriochloa punctata* (South); *Festuca heterophylla*; *F. ovina*; *F. rubra*; *F. scabrella* (Rocky Mountains); *Opizia stolonifera* (Mexico); *Panicum jumentorum* (South and in the tropics); *P. serotinum* (South); *Paspalum dilatatum* (in the South); *P. platycaule* (South); *Poa arachnifera* (South); *P. compressa*; *P. flabellata* (Falkland Islands); *P. nemoralis*; *P. pratensis*; *P. trivialis*; *Pollinia fulva* (Australia); *Stenotaphrum americanum* (South); *Triodia exigua*.

Salt marsh hay.—*Chloris glauca* (in the South); *Glyceria maritima*; *Spartina cynosuroides*; *S. juncea*; *S. stricta*.

Sand binders.—*Ammophila arenaria* (coast); *Calamovilfa longifolia* (interior); *Elymus arenarius* (coast); *E. mollis* (coast); *Imperata arundinacea* (coast, in the tropics, and Southern States); *Muhlenbergia pungens* (interior); *Panicum amarum* (coast); *P. repens* (coast); *Paspalum distichum* (in the South); *Redfieldia flexuosa* (interior); *Spinifex hirsutus* (coast, Australia); *Stenotaphrum americanum* (coast, South); *Thuarea sarmentosa* (in the tropics); *Uniola paniculata* (coast, in the South); *Zoysia pungens* (coast, southern Asia, Australia).

Soil binders (used to prevent the washing of river banks, railroad embankments, dams, etc.).—*Andropogon contortus*; *A. halepensis*; *Bromus inermis*; *Deschampsia cæspitosa*; *Distichlis maritima*; *Elymus condensatus* (Pacific Coast); *Holcus mollis* (Germany); *Imperata arundinacea* (in the tropics and Southern States); *Isachne australis* (tropics); *Oryzopsis membranacea*; *Panicum curtisii* (in the South); *P. virgatum* (interior); *Phalaris arundinacea* (interior); *Phragmites communis*; *Pollinia fulva* (Australia); *Spartina cynosuroides*.

Sweet-scented grasses.—*Andropogon laniger*; *A. nardus*; *A. scænanthus*; *A. squarrosus*; *Anthoxanthum odoratum*; *Hierochloë odorata*.

Weeds.—*Agropyron repens*; *Agrostis scabra*; *Alopecurus agrestis*; *Andropogon halepensis*; *A. virginicus*; *Arrhenatherum elatius* (New Zealand); *Avena fatua*; *Bromus mollis*; *B. secalinus*; *Cenchrus echinatus*; *C. tribuloides*; *Dactyloctenium ægyptiacum* (in the South); *Danthonia spicata* (New England); *Eleusine indica* (South); *Eragrostis major*; *Hordeum jubatum*; *H. murinum*; *Oryzopsis membranacea*; *Panicum capillare*; *P. crus-galli*; *P. proliferum*; *P. sanguinale*; *Setaria glauca*; *S. verticillata*; *S. viridis*; *Sporobolus indicus* (in the South).

In the arts and manufactures.—*Andropogon sorghum sativus*; *A. contortus*; *A. squarrosus*; *Aristida setacea*; *Arundinaria gigantea*; *Arundo donax*; *Bambusa species*; *Panicum junceum*; *Phalaris canariensis*; *Poa pratensis*; *Saccharum ciliare*; *S. officinarum*; *Secale cereale*; *Zizania aquatica*.

F. L. S.

JULY 15, 1896.

ECONOMIC AND ORNAMENTAL GRASSES.

Agropyron caninum R. & S. Bearded Wheat-grass; Awned Wheat-grass; Fibrous-rooted Wheat-grass.

A fibrous-rooted, rather slender, upright grass, 2 to 3 feet high, with bearded nodding heads or spikes resembling slender heads of wheat. This grass is more or less frequent in the northern parts of the United States, ranging from Maine to South Dakota. Bearded Wheat-grass is closely related to the more common and better known Couch-grass (*A. repens*), but differs markedly from that species in having no creeping rootstocks, and in the longer beards or awns to the spikelets. No attempts have been made to introduce this grass into general cultivation, but its habit of growth and general character indicate that it may possess considerable agricultural value. It is readily propagated by seeds, which may be easily gathered. *Agropyron richardsoni* Schrad. (*A. unilaterale* V. & S.) a closely allied species is abundant in the Rocky Mountain region, where it occasionally forms a considerable portion of the herbage of the "mountain parks."

Agropyron divergens Nees. Wire Bunch-grass; Apache Blue-grass (New Mexico); Wiry Wheat-grass.

A slender, usually densely tufted grass, 1 to 2 feet high or more, with very narrow, spreading leaves, and bearded or beardless spikes. The beards or awns, when present, are widely spreading or divergent. This grass is common in the Rocky Mountain and Pacific Slope regions, extending westward to the coast. On rich lands it often grows to the height of 3 feet, but upon the dry bench lands it rarely exceeds a foot or 18 inches in height. On dry lands the stems become wiry with age, and are avoided by stock; but the grass is considered valuable by the ranchmen for winter grazing. Samples of this grass received from some points in the West, particularly from Washington, indicate that it possesses much agricultural value when grown upon good soil, and as it will thrive in the semiarid regions of the Northwest, its cultivation may prove desirable. Propagated readily by seed, which can be easily gathered.

Agropyron glaucum Am. Auct. (See *Agropyron spicatum*.)

Agropyron japonicum. (See *Brachypodium japonicum*.)

Agropyron repens Beauv. Couch-grass; Witch-grass; Quitch-grass; Quick-grass; Quack-grass; Quake-grass; Wheat-grass; Creeping Wheat-grass; Dog-grass; Dutch-grass; Durfa-grass; Durfee-grass; Devil's-grass; Chandler's-grass; Scotch-grass; Twitch-grass; Fin's-grass. (Fig. 1.)

A grass abundant everywhere in the Eastern and Middle States, growing in the open fields, and in many places it has become one of the worst of weeds. Often the chief labor in managing hoed crops consists in subduing this pest. When once established, it is hardly less difficult to eradicate than the well-known Johnson-grass of the Southern States. It is, however, a valuable hay grass, and for two or three years the yield is large, but, like the Western Blue-stem, it "binds itself out," and the sod requires breaking in order to restore the field. It is

an excellent grass for binding railroad and other embankments subject to wash, and can be recommended for this purpose. The roots are well known in medicine under the name of *Radix graminis*. The simple infusion is used as a diuretic. Propagated by "root cuttings" or by seed.

***Agropyron repens* var. *glaucum* Am. Auct.** (See *Agropyron spicatum*.)

***Agropyron spicatum* Scribn. & Smith.** Colorado Blue-stem; Blue-joint; Blue-stem; Blue-grass; Wheat-grass; Wild Quack-grass; Gumbo-grass.

A grass closely resembling the Couch-grass of the Eastern States, and by some regarded as only a variety of it. It has the same strong and extensively creeping rootstocks, and the foliage and spikes are very similar, but the whole plant usually has a bluish color, whence the common name "Blue-stem," most frequently applied to it in the West. It grows naturally on the dry bench lands and river bottoms; and, although the yield per acre is not large, the quality of the hay is unsurpassed by any other species of the region where it grows. In Montana and the neighboring States it furnishes a considerable amount of native hay, and is there regarded as one of the most important of the native forage plants. After three or four successive annual cuttings, the yield diminishes very much, but the grass is "brought up" by letting it stand a year or two, or by dragging over the sod a sharp-toothed harrow, thus breaking the roots into small pieces, every fragment of which makes a new plant. This grass is quite distinct from the "Blue-stem" grasses of Nebraska, which are species of *Andropogon* (*A. provincialis*). There are a number of native species of *Agropyrons* or wheat-grasses in the Rocky Mountains, some of which are evidently excellent hay grasses and could be introduced into cultivation to advantage.



FIG. 1.—Couch-grass. (*Agropyron repens*.)

***Agrostis alba* Linn.** Herd's-grass; Bent-grass; English Bent; White Bent; Bonnet-grass; White-top; Dew-grass; Florin; Marsh Bent-grass. (Fig. 2.)



FIG. 2.—Red-top. (*Agrostis alba*.)

Under the botanical name of *Agrostis alba* are included a number of varieties, some of which have received distinct Latin names; as, for example, *Agrostis vulgaris* and *Agrostis stolonifera*, and many English or local names, that most generally applied in the Middle and Eastern States being Herd's-grass, and in the South, Red-top. The great variability of this grass has led to a considerable diversity of opinion in regard to its value. The taller forms are largely cultivated for hay, being usually mixed with timothy and clover. This grass requires considerable moisture in the soil, and is one of the best for permanent

pastures in the New England and Middle States. It makes a very resistant and leafy turf, which well withstands the trampling of stock. It grows well, also, as far south as Tennessee. Among the forms of low growth are two varieties which are unsurpassed, either in fineness or richness of color, for making lawns.

***Agrostis asperifolia* Trin.** Rough-leaved Bent.

This grass is common in the Rocky Mountain regions and on the Pacific Slope, growing chiefly in the mountain parks and along water courses. Its slender leafy culms are 2 to 3 feet high, and the narrow, pale-green, and densely flowered panicle 4 to 6 inches long. Judging from the appearance of this grass, it is likely to prove, under cultivation, superior to the Herd's-grass or Red-top of the East, at least for hay.

***Agrostis arachnoides* Ell.** Spider Bent-grass.

This is a low, slender grass, common on dry, thin soils in the Southern States. It rarely exceeds a foot in height, and is of no agricultural value.

***Agrostis canina* Linn.** Brown Bent; Dog's Bent; Mountain Red-top; Rhode Island Bent; Fine-top; Furze-top; Burden's-grass.

This species of bent has been introduced into this country from Europe, and is cultivated to some extent in the Eastern States. It resembles Herd's-grass (Red-top) somewhat, but has much finer root leaves. It makes a close sod, and is considered valuable for permanent meadows and pastures. It is one of the best grasses for lawns, and for this purpose should be sown at the rate of 3 to 4 bushels per acre. Retail price of seed quoted in New York catalogues, \$2.75 per bushel.¹

***Agrostis elata* Trin.** Southern Bent; Tall Thin-grass.

An upright, leafy grass, 2 to 3 feet high, with spreading panicles, frequenting swamps and low grounds in the Middle and Southern States. It is a perennial, coming into flower in the late summer and autumn months. Although no attempts have been made to cultivate it, its habit of late blooming may recommend it for mixtures designed for permanent pastures in locations adapted to its growth. It is always found growing with other grasses and does not form a turf by itself.

Agrostis elegans. Name applied by florists to *Aira elegans* and *Aira caryophyllea*.

***Agrostis exarata* Trin.** Northern Red-top; Mountain Red-top.

Under *Agrostis exarata* have been included a number of forms of Bent-grass, which occur in the Rocky Mountain regions and on the Pacific Slope. Some of these have been characterized as distinct species, and there are several among them which, from their tall, leafy habit and vigorous growth, indicate the possession of considerable agricultural value, although none of them have as yet been introduced into cultivation. They are deserving of the attention of the agriculturist, and their culture is recommended, particularly on the Pacific Slope. They would doubtless thrive in the Eastern and Middle States, and possibly supplant, by their greater luxuriance and better qualities, some of the species now cultivated.

Agrostis hiemalis. (See *Agrostis scabra*.)

***Agrostis nebulosa* Boiss. & Reut.**

A low grass with extremely delicate panicles of small spikelets. Frequently cultivated for dry bouquets. Native of Spain. Of no agricultural value.

***Agrostis perennans* Tuck.** Thin-grass.

This is a weak, decumbent grass, 1 to 2 feet long or less, with numerous leaves, and open, few-flowered panicles. It is found in swamps and moist woodlands in the

¹The prices of grass seed are subject to wide variation. With the standard seeds this variation depends chiefly upon the amount and quality of the season's supply.

Middle and Southern States, and in such places furnishes a moderate amount of native fodder of good quality. It may prove a valuable grass for cultivation under the shade of trees where the soil is not too dry.

***Agrostis pulchella*.** (See *Agrostis elegans*.)

***Agrostis scabra* Willd.** Rough Bent; Fly-away-grass; Tickle-grass; Hair-grass; Fool-hay; Silk-grass.

A slender, erect, tufted annual, with numerous very narrow basal leaves, and delicate, widely spreading capillary panicles, which at maturity break away from the culm, and are blown about by the wind, hence one of the common names, "fly-away-grass." Before the panicle has expanded, this grass is sometimes gathered in the vicinity of large towns and sold under the name of "silk-grass" for dry bouquets. It is widely distributed throughout the United States, in the Middle and Southern States coming into bloom in April and May. It possesses little or no agricultural value.

***Agrostis stolonifera* Linn.** Creeping Bent; Florin.

A variety of *Agrostis alba*, with long, prostrate or creeping stems, well adapted for sandy pastures near the coast, and useful, perhaps, for binding shifting sands or river banks subject to wash or overflow. It makes a good pasture grass for low lands, especially for those which are somewhat sandy, and produces a fine and enduring turf for lawns. It has a record of yielding on rich, peaty soil 7,742 pounds of hay and 2,722 pounds of green aftermath per acre. If sown alone, sow at the rate of 2 bushels per acre, or for lawns 3 bushels. Current retail price in New York, \$3.30 per bushel.



FIG. 3.—Floating Foxtail. (*Alopecurus geniculatus*.)

***Agrostis vulgaris* With.** Herd's-grass; Bent; Fine-top; Fine Bent; Rhode Island Bent; Furze-top; Tall Red-top; Burden's-grass; Red-top; Summer Dew-grass; Borden's-grass.

This is little more than a variety of *Agrostis alba*, already noted. It is quoted in the seed catalogues as a distinct species, and is recommended for mixtures designed for permanent pastures or meadows. It succeeds as far south as Tennessee, and is often sown with timothy and red clover. Retail price of seed, New York market, \$1.25 to \$1.50 per bushel.

***Aira caespitosa*.** (See *Deschampsia caespitosa*.)

***Aira elegans* Gaud.**

A slender, erect, and very pretty annual, from a few inches to a foot high, with widely spreading, capillary panicles of many small spikelets. Cultivated for dry bouquets. This and

the more common *Aira caryophyllea*, which has become spontaneous on dry, sandy soils in many places in the Middle States, are generally known to florists under the name of *Agrostis elegans*.

***Aira præcox* Linn.** Early Wild Oat-grass.

A low, tufted annual, 3 to 4 inches high, which has been introduced into this country from Europe, and is occasionally found in sandy fields in the Middle States. It has no agricultural value.

***Alopecurus agrestis* Linn. Slender Foxtail.**

A slender annual, 1 to 2 feet high, closely related to and somewhat resembling in appearance Meadow Foxtail. It is quite common in Europe, where it is native, and is generally regarded as a troublesome weed. It has only been sparingly introduced into this country. The seed, however, is advertised by New York dealers, the price being \$25 per 100 pounds.

Alopecurus aristulatus*. (See *Alopecurus geniculatus*.)**Alopecurus geniculatus* Linn. Water Foxtail; Floating Foxtail. (Fig. 3.)**

A low, usually procumbent grass, with slender stems 8 to 18 inches long, often rooting at the lower joints. It usually grows in wet places, and is very widely distributed throughout the north temperate zone. It has cylindrical heads or panicles, resembling those of Meadow Foxtail, but much smaller. This grass enters into the natural herbage of low, wet meadows and pastures, and in such places affords excellent grazing, being tender and nutritious. *Alopecurus aristulatus* is simply a variety of this, with short-awned flowering glumes. Under favorable circumstances this grass makes a good turf and a pleasing lawn of a deep rich green color, remaining green throughout the severe winter weather of the Middle States.

***Alopecurus occidentalis* Scribn. Mountain Foxtail; Mountain Timothy.**

A grass of the mountain meadows of the Rocky Mountains, growing in rich soil along streams and in the open parks. It has slender, erect stems 2 to 3 feet high, with short, oblong heads, thicker and shorter than those of common Meadow Foxtail. This grass is occasionally found covering extensive areas to the exclusion of other species. It yields a large bulk of fine, long, bright-colored hay, which is highly valued where it can be obtained. For the more elevated meadows of the Rocky Mountain region, and doubtless also for the New England and north Middle States, this grass would form an excellent addition to the cultivated species, and its introduction is recommended.

***Alopecurus pratensis* Linn. Meadow Foxtail. (Fig. 4.)**

This well-known European grass has been introduced into this country and cultivated to some extent in the New England and Middle States. It is a valuable grass for moist meadows and pastures, particularly the latter, on account of its early growth. On good soil it yields a large amount of excellent forage. In Europe it is regarded as one of the best perennial pasture grasses. It should enter into all mixtures for permanent pastures, because it is very lasting, highly nutritious, and earlier than most other species. This grass has a record of producing 20,418 pounds per acre of green grass, 6,125 pounds of hay, and 8,167 pounds of aftermath. It is never sown by itself, but is always mixed with other grasses and forage plants, because it gives a full yield only in the second or third year. Price of seed quoted in New York catalogues, \$2.25 per bushel, or \$25 per 100 pounds.

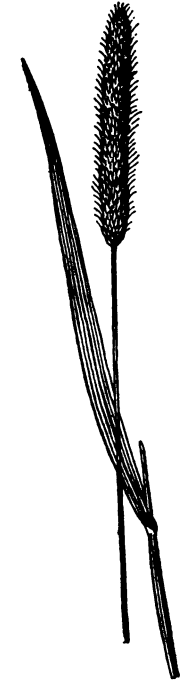


FIG. 4.—Meadow Foxtail. (*Alopecurus pratensis*.)

***Ammophila arenaria* Link. Beach-grass; Mat-grass; Common Sea-Reed; Sand-Reed; Reed; Sea-sand Reed; Marram. (Fig. 5.)**

This grass grows more or less abundantly along the sandy coasts of the Atlantic, and the shores of the Great Lakes. It has strong, creeping rootstocks, upright

stems 2 to 4 feet high, and long, rather rigid, leaves. The narrow, densely flowered panicle which terminates the stems is from 3 to 10 inches long. It is one of the most valuable of the grasses adapted to binding the drifting sands of our coasts, and has been cultivated for this purpose in this as well as in other



FIG. 5.—Marram or Beach-grass. (*Ammophila arundinacea*.)

of coarse paper, and it makes an excellent and very durable thatch. It is of no value for fodder.

***Ammophila arundinacea*.** (See *Ammophila arenaria*.)

***Ammophila brevipilis*.** (See *Calamovilfa brevipilis*.)

***Ammophila longifolia*.** (See *Calamovilfa longifolia*.)

***Andropogon affinis* R. Br.** Blue-grass (in Australia).

A leafy perennial, 1 to 2 feet high, native of Australia, where it is regarded as a valuable pasture grass. It is related to the big blue-stem (*Andropogon provincialis*) of this country, but is smaller in every way.

***Andropogon argenteus*.** (See *Andropogon saccharoides*.)

***Andropogon argyræus* Schult.** Silver Beard-grass.

A native grass of rather slender growth, 2 to 3 feet high, with narrow leaves and silvery-white, hairy racemes which terminate the culm and its branches. It is found chiefly along the borders of woods and thickets and in open fields, and blooms in September. It is a more tender grass than the common Broom-sedge of the South, to which it is closely related, and may have some agricultural value, although no attempts have thus far been made to cultivate it.

Andropogon bombycinus R. Br. Silky Heads.

An erect, rigid perennial, 1½ to 3 feet high, with narrow, flat and rather rigid leaves and densely silvery-silky spikes in a panicle 3 to 6 inches long. Native of Australia, where it is highly esteemed as a fodder plant. It is a species particularly resistant to drought.

Andropogon citratus. (See *Andropogon schenanthus*.)**Andropogon contortus** Linn. Twisted Beard-grass.

A stout, leafy perennial, 1 to 3 feet high, affording excellent grazing when young, but the mature seeds are much dreaded by sheep owners, as by their peculiar structure they not only become attached to and injure the wool, but often penetrate the skin and even the intestines. The strong rhizomes and tough fibrous roots which this grass has, commend it as a soil binder for river banks, dams, etc. The awns indicate by their twisting the amount of moisture in the air, and may be used as rain or fair weather indicators. In India this grass is used for thatching. It is a native of tropical and subtropical regions of both hemispheres, extending northward into western Texas, New Mexico, and Arizona.

Andropogon erianthoides F.v.M. Satin-heads.

An Australian grass, 2 to 3 feet high, with narrow leaves and densely silky-bearded spikes. It is very productive and is regarded as one of the best fodder grasses of eastern and subtropical Australia, either for pasturage or hay.

Andropogon furcatus. (See *Andropogon provincialis*.)

Andropogon halepensis Sibth. Aleppo or Aleppo grass; Johnson-grass; Cuba-grass; St. Mary's-grass; False Guinea-grass; Means-grass; Guinea-grass, (see *Panicum jumentorum*); Egyptian Millet; Egyptian-grass; Green Valley-grass; Alabama Guinea-grass; Australian Millet; Morocco Millet; Evergreen Millet; Arabian Millet; Syrian-grass. (Fig. 6.)

A stout perennial, with smooth, erect culms, 3 to 6 feet high, and strong, creeping rootstocks. The panicles are expanded during flower and are from 6 to 12 inches long. It is a native of southern Europe and the warmer parts of Asia and northern Africa. It was introduced into this country about sixty years ago, and has now become widely distributed and well known throughout the Southern States. In the warmer parts of the Southern States it makes rapid growth, is but little affected by drought, and the hay, if cut just as the grass is coming into bloom, is much liked by all kinds of stock. Two or three cuttings may be made during the season. The extensively creeping rootstocks are fleshy and tender, and hogs are very fond of them. These roots literally fill the ground near the surface, and every joint is capable of developing a new stem. This grass, when once it has become established, is exceedingly difficult to eradicate, and hence it has



FIG. 6.—Johnson-grass. (*Andropogon halepensis*.)

come to be greatly feared by the majority of farmers. Unless one wishes to give up his land entirely to Johnson-grass, and can certainly avoid its spreading to the lands of others, its introduction would be of doubtful economy, owing to its powerful and rapidly spreading roots. In India the natives make rude pens from the stems.

***Andropogon hallii* Hack.** Turkey-foot; Colorado Sand-grass.

This is a stout grass, from 3 to 6 feet high, closely related to the Big Blue-stem (*Andropogon provincialis*), but appears to be confined to the sandy regions of the West. It is common in the sand hills of Nebraska, and extends southward into Texas. Its agricultural value is not known, but it is probably about the same as that of Big Blue-stem.



FIG. 7.—Bushy Blue-stem.
(*Andropogon nutans*.)

***Andropogon iwarancusa* Blan.**

A stout grass, 3 to 5 feet tall, native of southern Asia and tropical Africa, closely related to *A. nardus*. The root has a bitter and aromatic taste, and affords a medicine which in India is used for cholera.

***Andropogon laniger* Desf.**

A slender, rigid grass, 1 to 2 feet high, native of India and northern Africa, growing in the dry, hilly, or mountain regions. It is sweet scented, and from it is manufactured a perfume (*Herba schœnanthi* or *Junci odorati*). The aromatic oil is sometimes used as a cooling medicine, and the fragrant roots are occasionally woven in screens and mats, as are those of *A. squarrosus*.

***Andropogon macrourus* Michx.** Brook-grass; Cluster-flowered Beard-grass.

This is a stout-growing species, often attaining a height of 6 feet, and in many characters resembles the common Broom-sedge (*Andropogon virginicus*). It is far less common, however, and is confined to wet, swampy places, hence one of the common names "Brook-grass." It has no recognized agricultural value.

***Andropogon montanus* Roxb.**

A native of southern Asia and northern and eastern Australia, with somewhat woody stems 12 to 20 inches high, narrow leaves and oblong panicle, 2 to 5 inches long. A perennial of rapid growth and valuable for fodder when young. The grain is collected and used as food by the natives of the hilly parts of northern India.

***Andropogon muricatus*.** (See *Andropogon squarrosus*.)

***Andropogon nardus* Linn.** Citronella-grass.

A native of southern Asia and northern Australia; also cultivated in Ceylon because of its value in yielding, as it does, the oil of commerce known as citronella oil, which is used for scenting soap, as a condiment, and for perfumery. It is stated that 40,000 pounds of citronella oil are distilled from this grass annually in Ceylon, and the annual value of the export of this product from that country alone is placed at about \$35,000.

***Andropogon nutans* Linn.** Bushy Blue-stem; Indian-grass; Reed-grass; Wild Oat-grass. (Fig. 7.)

This is a stout perennial, 4 to 6 feet high, growing in dry soil along the borders of fields and open woods, and on the prairies in the West it often forms a

considerable proportion of the so-called prairie hay. It is held in little esteem in the Eastern and Southern States, but in the West it is said to make excellent hay, and is particularly valuable because of the relatively large amount of long root leaves which it produces. All stock eat it greedily. In South Dakota it is given the first place among the native grasses as a hay-producing species, thriving best on the rich prairie bottoms. During the dry season it produces but little seed, though it usually makes a good growth of root leaves. In the middle Atlantic States this grass seeds freely and the seeds are easily collected.

***Andropogon pertusus* Willd.**

A slender, erect perennial, 1 to 3 feet high, native of southern Asia and tropical and subtropical Australia. In the latter country it is regarded as an excellent pasture grass, much liked by cattle and sheep, and possesses the special merit of withstanding long periods of drought.

***Andropogon provincialis* Lam.** Big Blue-stem; Finger-spiked Beard-grass; Finger-spiked Wood-grass; Finger-spiked Indian-grass; Blue-stem; Blue-joint; Blue Bent (in Rhode Island); Blue-grass; Turkey-foot. (Fig. 8.)

A stout perennial, with erect, more or less branching, and often bluish or glaucous stems, 2 to 6 feet high, long leaves, and flowers in short spikes, which stand two to five close together at the apex of the stem or its branches. These spikes are bluish or purple, sometimes pale green, and more or less hairy. This grass has a wide range, extending over the United States east of the Rocky Mountains, and in the West and Northwest, particularly in the Missouri region, it is very abundant, and is highly valued for hay. It grows in a great variety of soils, and under extremely varying conditions of climate, and enters largely into the composition of the hay of the prairies. The early growth consists of a great abundance of long leaves, and if cut in early bloom the hay is readily eaten by horses and cattle, but if allowed to fully mature the stems become hard and woody and the hay produced is of inferior quality. Investigations of the seed production of this *Andropogon* indicate that it matures seed rarely. It is stated that a very favorable season of moisture is required to make it fruit abundantly. This lack of fertility, if really true, will be a serious obstacle to the general propagation of the grass by the usual and convenient method of seeding.



FIG. 8.—Big Blue-stem. (*Andropogon provincialis*.)

***Andropogon saccharoides* Swz.** Silver Beard-grass.

A variable grass, growing, to the height of 1 to 3 feet, with narrow, silvery bearded panicles. Some forms of this species have been introduced into cultivation for ornament. It is a native of our Southwestern States and Territories, in some of its varieties extending southward to Chile, where it is regarded as one of the best pasture grasses of the Cordilleras.

***Andropogon schenanthus* Linn.** Lemon-grass; Ginger-grass; Rusa-grass; Geranium grass.

A native of southern Asia, Japan, and tropical Africa. This grass is closely related to *A. nardus*, and, like that species, yields a valuable product known in commerce as lemon-grass oil. This oil, as well as that obtained from *A. nardus*, is

used as a stimulant and antispasmodic for neuralgia and rheumatism, and also in the adulteration of attar of roses. *A. citratus* (referred to by Hackel as belonging to either *A. schenanthus* or *A. nardus*) is extensively cultivated in India and Ceylon and yields a fragrant oil called both oil of verbena and lemon-grass oil (William Hutchinson). Rusa oil, or ginger oil, is obtained from *A. schenanthus*, according to Hutchinson.

Andropogon scoparius Michx. Little Blue-stem; Indian-grass; Purple Wood-grass; Wire-grass; Brown-grass; White Bent; Broom Sedge; Broom-grass; Mountain Sedge-grass. (Fig. 9.)

A rather slender perennial, 1 to 3 feet high, more or less branched above; the slender racemes are single and terminate the culm or its branches. This grass has a similar range to the Big Blue-stem, extending over nearly all of the United States east of the Rocky Mountains, and in the prairie regions it is nearly always found associated more or less abundantly with the Big Blue-stem and Bushy Blue-stem. It is common in the mountain districts of the South, and is valued there for grazing. In the West it is cut for hay, but is not so much thought of as the Big Blue-stem. In South Dakota this is one of the most common grasses in the basins of the Bad Lands.



FIG. 9.—Little Blue-stem. (*Andropogon scoparius*.)

Andropogon sericeus R. Br. Blue-grass.

A rather slender branching grass, 1 to 3 feet high, native of the warmer regions of Australia. It is very productive, and is generally known as blue-grass. Regarded by the Australians as one of the best of the indigenous grasses for pasturage or hay making.

Andropogon sorghum Brot. Subspecies *sativus* Hack. Includes the cultivated varieties of sorghum.

Andropogon sorghum includes many varieties, a number of which have been recognized by some authors as distinct botanical species under the genus *Sorghum*; others, including Hackel, have referred them all to the genus *Andropogon*. Hackel has elaborately worked out the botanical characters of the species and characterized the known varieties, giving to each a technical name. It is not necessary to follow out his classification, which is apparently good. In the works of others there is much confusion in the botanical classification, and still more in the application of the common or English names. The same name has been applied to different varieties, and the same variety has often been designated under various names. All the forms are of Eastern origin, and have arisen probably from a common stock through ages of cultivation. From varieties

of this species are obtained grain, which furnishes nutritious food for man and domestic animals, particularly poultry; sirup and sugar in commercial quantities are obtained from the saccharine varieties. The variety *saccharatus*, or Chinese sugar-grass, yields about 13 per cent of sugar. Brooms and brushes, used in all civilized countries, are made from the inflorescence of the variety known as broom corn, and all furnish fodder of more or less value for farm stock. In Africa alcoholic drinks are prepared from the grains, and useful coloring pigments are contained in the fruiting glumes. The variety known as Kafir corn, which grows to the height of 4 or 6 feet, has been cultivated with great success as a fodder plant in the semiarid regions of the West. In fact, all the sorghums will grow in drier climates or under more trying conditions of drought than Indian corn. They may be cultivated in much the same way as that cereal, but

the seed may be planted more thickly. In chicken corn or white Egyptian corn (var. *cernuum*) the densely flowered panicle is abruptly bent or recurved, so that it points downward. This variety is largely cultivated in tropical and northern Africa and in some parts of southern Asia, where it is used as a cereal. It is occasionally grown in this country, the seed being prized as food for poultry. The varieties adapted for the production of fodder or silage are particularly valuable for cultivation in the South and Southwest. The amount of fodder produced is often very large, of excellent quality, and there are few among the larger grasses better adapted for soiling. Yellow Milo Maize, White Milo Maize, and Jerusalem Corn, non-saccharine varieties of *Andropogon sorghum*, are grown both for fodder and for the seed, particularly in the Southwestern States.

***Andropogon sorghum* var. *halepensis*.** (See *Andropogon halepensis*.)

***Andropogon sorghum* var. *vulgaris*.** Name now adopted for *Sorghum vulgare*. (See *Andropogon sorghum*.)

***Andropogon squarrosus*.** Linn. f. Vetivert; Khushus or Bene.

A stout perennial, 4 to 6 feet high, with strong, fibrous, and highly fragrant roots. A native of India, occurring also in some of the West India Islands and Brazil, growing in marshes and on river banks. Introduced into Louisiana many years ago, and now spontaneous in some of the lower parts of that State. Cultivated successfully at Knoxville, Tenn., where the fragrance of the rhizomes and roots was developed to a marked degree, but the plants did not bloom. In India this grass is largely used for thatching, and is woven into mats, which serve as screens or shades for doors and windows (tatties), awnings, covers for palanquins and fans, and brushes used by weavers in arranging the thread of the web are made from either the roots or the whole plant. The roots, laid among clothing, impart a pleasing fragrance to the garments and are said to keep them free from insects. Fans made from the root fibers were among the articles on sale at the World's Fair in the Javanese bazaar. The roots are an article of commerce sold by druggists. In European drug stores the roots are known as *Radix anatheri* or *Radix vetiverie*, a stimulant or antiseptic. They yield a perfume known as *vetivert*, or, in India, *itar*.

***Andropogon virginicus* Linn.** Broom-sedge; Broom-grass; Virginia Beard-grass; Sedge-grass. (Fig. 10.)

A rigidly erect perennial, 2 to 4 feet high, bearing a narrow, elongated, and loosely-branched panicle of silky-bearded racemes. The stems are strongly flattened near the base, and at maturity they are too hard and woody to be eaten by stock or to be of any value for hay. When young, however, this grass affords most excellent grazing. Milch cows fed upon it are said to yield butter of superior quality. There is probably no native grass better known to the farmers of the South than this, and although possessing some value, as here indicated, it is, broadly speaking, one of the worst weeds of that section, interfering seriously with the formation of permanent meadows. Constant tillage or very close grazing appear to be the only means of keeping this grass from occupying the land.



FIG. 10.—Broom Sedge (*Andropogon virginicus*.)

***Anthistiria avenacea* F. v. Muell. Tall Oat-grass.**

This is said to be one of the best fodder grasses of Australia, where it is native, and widely distributed over that continent. It grows mostly in tussocks, 4 to 5 feet high, producing a large quantity of leaves at the base, which, when young, yield a large amount of nutritious fodder. It is only found upon the richest soils and is particularly noticeable for its drought-resisting qualities, due doubtless to its deeply penetrating roots. The seeds are large, resembling oats somewhat in appearance, and they can be easily harvested. Mr. Fred Turner recommends this grass for systematic cultivation, both in the coastal regions and in the interior. It is deserving of trial in our Southern States. Hackel classes this species under *Themeda gigantea* as a variety.

***Anthistiria ciliata* Linn. Kangaroo-grass.**

A perennial, 1 to 3 feet high, native of tropical Asia and Africa, extending into Australia, where it is commonly known as "Kangaroo-grass," and regarded as one of the most valuable of the indigenous species for grazing. It is a grass quite similar in habit to the Broom-sedge of our Southern States, and is probably of less value than the Blue-joint of our prairie regions (*Andropogon provincialis*).

***Anthoxanthum odoratum* Linn. Sweet Vernal-grass; Sweet-scented Vernal-grass; Sweet-scented Spring-grass; Sweet-scented-grass; Vernal-grass. (Fig. 11.)**

A perennial, early-flowering, sweet-scented grass, introduced into this country from Europe, and now widely distributed over the Eastern and Central States. It is an inferior fodder grass, but owing to its earliness it possesses some value in mixtures for pastures, and its sweet scent adds a pleasing fragrance to hay, of which it should form only a small percentage. The leaves have a bitter taste, and the grass is apparently unpalatable to stock, for they will not readily eat it. It is regarded as a serious pest in New Zealand. The stems have been used in the manufacture of imitation Leghorn hats. Price of seed quoted in New York catalogues, \$6 per bushel. Weight per bushel, about 10 pounds.

***Aristida californica* Thurb. Hare's-grass, "Zacate de liebre."**

A low, much branched, tufted grass, 5 to 10 inches high, native of the arid regions of southern California and Mexico. It has no agricultural value.

***Aristida dichotoma* Michx. Poverty-grass.**

A much-branched, slender annual, 6 to 18 inches high, common in dry, sterile soils in open fields, whence the name "Poverty-grass," frequently applied to it. Wholly worthless.

***Aristida lanata* Poir. Woolly Poverty-grass; Woolly Triple-awn; Poverty-grass.**

A rather stout perennial, with simple stems 2 to 3 feet high. More or less common in the pine barrens of the south Atlantic States. Has no agricultural value.

***Aristida oligantha* Michx. Prairie Triple-awn.**

A tufted, much-branched, native annual grass, 6 to 18 inches high, common from Maryland to Illinois and southward, growing in dry, gravelly soil in open fields. Blooms in the latter part of the summer, and when abundant the long-bearded flowers impart to the field a grayish hue. Of no agricultural value, but rather a weed, indicating poor soil or a shiftless landowner.

***Aristida purpurascens* Poir. . Beard-grass.**

A taller and somewhat stouter grass than *Aristida oligantha*, and less branched. It grows in similar situations, ranging from Massachusetts to Michigan and southward to Florida. Valueless.

***Aristida purpurea* Nutt. Purple Beard-grass; Western Beard-grass; Beard-grass; Mesquit (or Mezquit) grass. (Fig. 12.)**

Purple Beard-grass grows from 6 inches to a foot high, and is a native of the arid regions, from Montana southward to Texas, where it is particularly abundant in poor soils, and presents a great variety of forms. It is usually found in dry, gravelly soils on the plains, mesas, and foothills. In the Eastern and Middle States the species of *Aristida* are deemed of little or no value, but in the South-

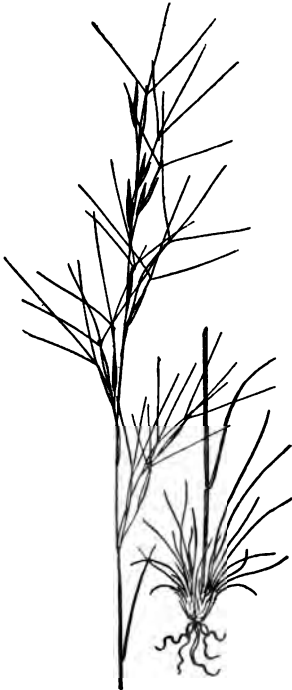


FIG. 12.—Purple Beard-grass.
(*Aristida purpurea*.)



FIG. 13.—Tall Oat-grass.
(*Arrhenatherum elatius*.)

west, where every mouthful of fodder of any sort has value, they are not wholly worthless. *Aristida schiedeana* and *A. bromoides*, growing upon rocky and desert soil in Arizona and New Mexico, supply in their thin, scattered tufts “dainty bits seized upon by stock with avidity.” (Pringle.)

***Aristida setacea* Retz.**

Common in the drier regions of India, growing in dry, poor soils. The Telinga paper-makers construct their frames of the culms. This grass is used also for making brooms, toothpicks, and screens called tatties.

***Aristida stricta* Michx. Downy Triple-awn; Wire-grass.**

This is one of the “wire grasses” of the Southern States, growing to the height of 2 or 3 feet. The simple stems are terminated by a narrow panicle, usually a foot in length. It is common along dry, sandy ridges and in the pine barrens.

***Aristida tuberosa* Nutt.** Long-awned Poverty-grass.

A rigid, much-branched grass, 12 to 18 inches high, with long-bearded spikelets.
Found in similar situations with *Aristida stricta*, and equally valueless.

***Aristida virgata* Michx.** Beard-grass.

Similar in habit and appearance to *Aristida stricta* and of about the same agricultural value.

***Arrhenatherum avenaceum*.** (See *Arrhenatherum elatius*.)

***Arrhenatherum elatius* M. & K.** Tall Oat-grass; False Oat-grass; Tall Meadow Oat-grass; Evergreen-grass; Oat-grass; Grass-of-the-Andes; French Rye-grass. (Fig. 13.)

A loosely tufted perennial, 2 to 4 feet high, introduced from Europe as a fodder grass and now quite generally distributed over the regions east of the Mississippi. In Europe it is regarded as one of the best meadow grasses, but is not recommended for pastures. It does well in the Southern States, where it is frequently cultivated, and is valued both for winter grazing and for hay. In California

it is spoken of in the highest terms, particularly for its drought-resisting qualities. It does not form a very compact turf, and when sown should be mixed with other grasses. It grows rapidly, blooms early, and when cut dries out readily. It is not suited to heavy, moist soils, but thrives best on loamy sands or loams. It produces a large yield, and on good soils three or four cuttings may be obtained during the season. It is best sown in the spring, but in the Southern States it may be sown in September to advantage. In New Zealand this grass is spoken of as fast becoming a weed in mixed pastures, and further, it is stated that the early growth is much relished by stock, but later in the season it is not touched. On rich, clayey loam this grass has made a yield of 17,015 pounds of green fodder, 6,380 pounds of hay, and 13,612 pounds of green aftermath per acre.



FIG. 14.—Cane. (*Arundinaria gigantea*.)

When sown alone, the amount of seed to sow per acre is 5 to 6 bushels. Owing to the structure of the seed, it may be sown deeper than most other grasses. Price of seed, quoted from New York catalogues, \$3.25 per bushel, or \$18 per 100 pounds.

***Arundinaria gigantea* Chapm.** Cane; Large cane. (Fig. 14.)

This is the grass which forms the well-known canebrakes of the South. It is perennial, with woody stems 10 to 30 feet high, and evergreen leaves, which furnish a valuable supplement to the winter pastures. Thousands of animals have almost no other food. The fodder furnished, however, does little more than sustain life, and is of no value for fattening or for milch cows. Attempts made to cultivate this grass have not been successful. The plant blooms but once, and when the seeds mature the cane dies. The canes are used for many purposes, such as fishing rods, scaffolds for drying cotton, splints for baskets, mats, etc.

***Arundinaria macrosperma*.** (See *Arundinaria gigantea*.)

***Arundinaria tecta* Muhl.** Small cane; Reed.

This is regarded by some as only a variety of the cane mentioned above, but it is of smaller growth, rarely exceeding 10 feet in height, and extends as far north as Maryland. Its woody stems and perennial leafage are like those of *A. gigantea*, affording similar fodder to cattle upon the winter ranges.

There are many species of *Arundinaria* in India. Among them may be mentioned:

Arundinaria falcata. An annual, 6 to 10 feet high. The stem and leaves are used for roofing and in making baskets.

Arundinaria hookeriana furnishes rice-like edible seeds, which are boiled and made into cakes or into beer.

Arundinaria racemosa, with stems 2 to 4 feet high. Used for making mats and roofing. A good fodder plant.

Arundinaria wightiana. Furnishes the walking sticks of Mahableshware. The young stems are eaten.

***Arundo donax* Linn.** Reed; Cane.

A tall, leafy perennial, attaining the height of 10 to 15 feet, or in very favorable locations, even 30 feet. The leaves are broad and widely spreading, and the stems are leafy to near the top. The panicle has some resemblance to that of pampas grass, but is not so large. This grass is grown for lawn decoration and to conceal unsightly objects. It is a native of southern Europe, northern Africa, and western Asia, and is said to be spontaneous along the Rio Grande. In some countries the stout stems are used for laths, and when split, for woven work; the leaves are used for thatch or roofing, and the stout rhizomes are employed as a diuretic. A cultivated variety has its broad leaves striped with longitudinal white bands. It presents a very striking appearance. This grass is propagated by transplanting the roots, which work may be done at any time during the season. After growth has fairly commenced the subsequent development is very rapid, and for this reason it is one of the most important plants of its class for quickly producing scenic effects or for concealing unsightly objects.

***Asprella hystrix* Willd.** Bottle Brush; Hedgehog-grass.

A rather stout, perennial grass, 3 to 4 feet high, with spreading flat leaves 5 to 10 inches long, and terminal bearded spikes 3 to 6 inches long. It is a native, growing in moist woodlands and along thicket borders. When mature the spikelets stand out at right angles to the axis and give the head the appearance of a brush such as is used for cleaning bottles, hence the common name. This grass has been recommended as ornamental, for lawn decoration. It possesses no recognized agricultural value.

***Astrelba pectinata* F. v. Muell.** Mitchell-grass.

A smooth, erect grass, 1½ to 3 feet high, with flat, long-pointed leaves and densely flowered terminal spikes or heads. It is a native of Australia, growing naturally upon the interior plains. It is regarded by the stockmen of that country as the best of all native grasses, both for its drought-enduring qualities and for its fattening properties. If cut just when coming into bloom, it makes excellent hay. The seed is produced in abundance, and is easily collected. This may prove a valuable grass for the semiarid districts of the Southwest. The seeds of this grass, as well as those of the closely related *Astrelba triticoides*, were formerly used for food by the natives of Australia.

***Avena elatior*.** (See *Arrhenatherum elatius*.)

***Avena fatua* Linn.** Sand-oats; Wild-oats. (Fig. 15.)

An erect annual, 2 to 3 feet high, with loose, open panicles, 8 to 10 inches long, the whole aspect of the plant closely resembling forms of the cultivated oat. The

spikelets are larger, however, and the flowering glumes are covered with long, brown hairs, and have a twisted awn an inch in length. It is a native of the Mediterranean region, but is now widely distributed over grain-growing countries, and is especially common in California and Oregon, and has spread eastward to Minnesota. It is of rare occurrence in the Eastern States. By some this is supposed to be the original of the cultivated oat (*Avena sativa*), which is said to readily degenerate into it. *Avena fatua* is in most places regarded as a troublesome weed. When abundant in the grain fields, it occupies the place of better plants, and reduces the grade of the thrashed grain by the admixture of its inferior and lighter seeds. The stiff and twisted awns are injurious to stock, as they frequently cause irritation of the nostrils and mouths of the cattle feeding upon them. In California the young plants, before the

bearded or awned spikelets mature, are esteemed for grazing and forage. "The use of the Wild-oat, with its brown, hairy seed and twisted awn, as an artificial fly by fishermen, is well known, the uncoiling of the awn when wetted causing those contortions by which it imitates a fly in trouble." (Hooker.) A form of the Wild-Oat with the flowering glume smooth (var. *glabrescens* Coes.) is quite widely distributed on the Pacific Slope.



FIG. 15.—Wild Oats. (*Avena fatua*).

It is a European grass, and has been introduced into this country from that source, and is occasionally found in the grain region of the Pacific Slope. The soils best suited to the growth of this grass are sandy loams, upon which it is valuable for early mowing and pasturage. Under favorable conditions it has produced 15,654 pounds of green grass, 5,870 pounds of hay, and 6,860 pounds of aftermath per acre.

***Avena sativa* Linn. Oats.**

A well-known erect annual, 2 to 4 feet high, with flat leaves and expanded panicles of rather large pendulous spikelets. There are many varieties, which have been divided into two classes: "panicle oats," with widely spreading panicle branches; and "banner oats" with the panicles somewhat contracted and one-sided. These two races are divided into "chaffy" and "naked-fruited" sorts, and further

***Avena flavescens*. (See *Trisetum pratense*.)**

***Avena hookeri* Scribn. Native Meadow Oat-grass.**

In the grassy parks and on the foothills of the eastern slopes of the Rocky Mountains, this *Avena*, which closely resembles the *Avena pratensis* of Europe, is frequently found associated with the other native grasses. Where abundant it makes a valuable addition to the grazing resources of the country. It is deserving of a trial under cultivation.

***Avena præcox*. (See *Aira præcox*.)**

***Avena pubescens* Linn. Downy Oat-grass.**

This grass is similar in habit and appearance to *Avena fatua*, but is much less common.

varieties are established upon the color, form, or some special character of the grain. Oats have been cultivated from very early times in Europe, and they form the principal grain of such northern countries as Norway and Sweden, and Scotland, and in these countries boiled oatmeal and oatmeal cakes are important articles of food. Boiled oatmeal is also much used in this country, especially at breakfast. The grain, however, is principally cultivated here as food for horses. In the Southern States, oats, particularly winter oats, are largely grown for forage. Sown in August, they furnish the best grazing from October to the latter part of April, and will then yield a more certain and a larger crop of grain than spring-sown oats. They are often cut green for soiling and for hay. Oat hay is quite extensively used in the South and in California. The practice is to cut when the grain is in the "dough" stage, or when the straw commences to turn yellow below the head and the leaves are still green. The yield ranges from 3 to 4½ tons per acre, according to the variety and the season. The feeding value of oat hay is higher than that of timothy, containing from 10 to 12 per cent of protein, and 55 to 65 per cent of fat formers, while the latter (timothy) contains from 5 to 7 per cent protein, and 45 to 55 per cent fat formers. Among the cereals, oats is the most nutritious, but oat flour lacks the gluten of wheat, rendering the making of bread from it impossible. Oatmeal is richer in nitrogenous matter than soft wheats, and contains more fat than any of the other grains. Russian "quas" beer is made of oats.

***Avena sterilis* L. Animated Oats.**

A stout, oat-like grass, with one-sided panicles, and very large, awned spikelets; the awn is very long, twisted, and "kneed" or geniculate. It is the twisting and untwisting of these awns when exposed to changes of moisture and dryness that has given to this grass the common name of "animated oats." The untwisting or coiling-up of the awn causes the spikelet to tumble about in various directions, suggestive of independent motion or life-like activity.

***Avena striata* Michx. Purple Wild Oat-grass.**

This is a slender woodland grass of graceful habit, found in the northern Middle States, and extending westward to the Rocky Mountain region. Of no agricultural value, but possibly worthy of some attention for cultivation in woodland parks or pastures in the Northern States.

***Bambusa*. Bamboo.**

The bamboos belong to the *Bambuseæ*, a tribe of grasses numbering about 175 species, chiefly limited to South America, southern and eastern Asia, and the East Indies. There are no European species, and only one in North America. Of the whole number of species only one is common to both hemispheres. The largest bamboos attain a height of 120 feet, with a diameter of a foot or more. A South American species has leaves 3 to 12 inches wide and 5 to 15 feet long. In India are extensive bamboo forests, and in countries where these grasses abound they are employed for many purposes. They furnish material for the complete construction and furnishing (including domestic utensils) of houses. They are used in shipbuilding and in the construction of bridges. Buckets, pitchers, flasks, and cups are made from sections of the stems. Baskets, boxes, fans, hats, and jackets are made from split bamboo. Ropes and Chinese paper are made from these grasses. A Chinese umbrella consists of bamboo paper, with a bamboo handle, and split bamboo for a frame. The leaves are used for packing, filling beds, etc., and occasionally serve as fodder for stock. The young shoots serve as a vegetable. Tabashir, or bamboo manna, a silicious and crystalline substance which occurs in the hollow stems of some bamboos, is regarded as possessing medicinal properties. Good drinking water collects in quantities in the

hollows of the internodes of many of the larger bamboos. All sorts of agricultural implements, appliances for spinning cotton and wool or for reeling silk are often constructed entirely from bamboos. Very many articles of household use or decoration made from bamboo have become articles of commerce in Europe and this country. So many and varied are the uses of the several species of bamboo that it is possible to mention here only a small part of them. Bamboos are propagated by seed, but more often by cuttings. Plants from the seed do not attain a sufficient growth to admit cropping under 10 or 12 years.

Beckmannia erucæformis Host. Slough-grass (in Montana); Wild Timothy (in Nevada). (Fig. 16.)

A stout, erect, subaquatic perennial, 1 to 4 feet high, with narrow, densely flowered panicles. The leaves are broad and flat, and the stems are coarse but tender, becoming somewhat woody when old. It grows along the banks of streams and rivers and frequently follows the course of the irrigating ditches. When young, however, this grass is palatable and readily eaten by stock. In some portions of the Northwest, to which region this grass is confined in this country, it often occurs in such quantities as to constitute an important part of the forage of low pasture lands. It may be recognized by the peculiar, spike-like branches of the panicle, which have some resemblance to the rattles of a rattlesnake, and for this reason it is sometimes called "Rattlesnake-grass." It is deserving of trial under cultivation for low meadow lands in the more Northern States.



FIG. 16.—Slough-grass.
(*Beckmannia erucæformis*.)

Blepharidachne. Desert-grass.

There are two species of *Blepharidachne*, both low, tufted grasses, peculiar to the barren and desert regions of Nevada, Arizona, and New Mexico. They do not appear to be at all common, but in the regions where they occur every grass possesses some value for wandering stock, and these doubtless play some part in affording a bite for starving cattle.

Bouteloua curtipendula. (See *B. racemosa*.)

Bouteloua eriopoda Torr. Woolly-jointed Grama.

This is one of the species of Grama so valuable for grazing in New Mexico and Texas. The slender stems are 1 to 2 feet high, and from its thrifty habit of growth it forms dense and excellent pasturage wherever it grows abundantly. It is a common grass along the Del Norte and in the region between that station and the waters of the Gila; also in the Olympia, Guadalupe, and Eagle mountains, and on the Staked Plains in Texas. The woolly-jointed stems at once serve to distinguish this from the allied species of *Bouteloua*.

Bouteloua hirsuta Lag. Black Grama (Texas); Bristly Mesquit, Muskit, or Meskit-grass; Tall Grama. (Fig. 17.)

This grass is very similar in habit, appearance, and qualities to Blue Grama, and is frequently found associated with it, although, generally speaking, it is much less abundant.

Bouteloua oligostachya Torr. Blue Grama (Texas); Mesquit-grass; Muskit-grass; Grama; Black Grama (New Mexico); Mosquit-grass; Buffalo-grass (in Montana); White Grama; Crowfoot Grama. (Fig. 18.)

This is one of the most abundant and most valued of the Grama grasses, and extends from Wisconsin westward to California, and southward into Texas and northern Mexico. It is a perennial, 6 to 18 inches high, its strong rhizomes and numerous root-leaves forming dense and more or less extensive patches of excellent turf. In Montana it is known as Buffalo-grass. It frequents the bench lands of that State, growing at elevations from 3,000 to 4,000 or 5,000 feet, and not infrequently covers wide areas. No other grass better withstands the tramping of stock, and it is unsurpassed for grazing purposes. In the Southwest it forms a large proportion of the hay delivered at the various military posts and stage stations, and is considered the best obtainable there. Like the true Buffalo-grass, it cures during the dry season in the turf into perfect hay, losing none of its nutritious properties.



FIG. 17.—Black Grama.
(*Bouteloua hirsuta*.)



FIG. 18.—Blue Grama. (*Bouteloua oligostachya*.)



FIG. 19.—Tall Grama or Side Oats.
(*Bouteloua racemosa*.)

Bouteloua polystachya Torr. Low Grama; Six-weeks'-grass; Many-eared Grama. This is a small, slender grass, of good quality. It is one of the smallest of the Gramas, and only occurs sparingly here and there in scattered tufts. It rarely exceeds 6 inches in height, and is confined to the arid regions of the Southwest.

Bouteloua racemosa Lag. Tall Grama; Side Oats; Hairy Mesquit; Muskit-grass; Black Grama; White Grama. (Fig. 19.)

This is among the tallest of our species of *Bouteloua*, the rather stout, tufted stems being from 1 to 3 feet high. It has tough, perennial, fibrous roots, flat, long-pointed leaves, and many short spikes arranged along the upper portion of the stem. Its range extends from New Jersey westward to the Rocky Mountains, and southward through Texas into Mexico. Where abundant, it is said to make fair hay, and the numerous root-leaves afford good pasturage. The hay is

readily eaten by stock, but on the range cattle show a decided preference for Blue Grama. Several species of the Grama have been successfully grown in small cultures at some of the experiment stations, but none of them, although apparently most valuable as pasture grasses for the semiarid regions, have been introduced into general cultivation.

Bouteloua texana Watson. Texan Mesquit; Mesquit.

This is a small but excellent grass, common about San Antonio and at other points in Texas, chiefly along the Rio Grande. It has not been recognized as an important grass in the stock ranges.

Brachypodium japonicum Miq. Japanese Wheat-grass.

A promising Japanese perennial, closely resembling Bearded Wheat-grass (*Agropyron caninum*), but of rather stronger growth. It was introduced into California by the Agricultural Experiment Station of the University of California, at Berkeley, from New Zealand, in 1886, and the first seed was distributed in California in 1889. It has been cultivated with success at a number of points in California and at several of the experiment stations in the East. In the Southern States it is regarded as a valuable grass for winter grazing, as it makes its best growth during the cooler months.



FIG. 20.—Small Quaking-grass. (*Briza media*.)

Briza bipinnata Linn. (See *Eragrostis cynosuroides*.)

Briza media Linn. Quaking-grass. (Fig. 20.)

An erect perennial, from 1 to 2 feet high, introduced into this country from Europe because of its pleasing ornamental appearance. It has escaped from cultivation in many places, and has become sparingly naturalized. It is occasionally cultivated for ornament, and the nodding panicles of rather showy spikelets are used for winter bouquets. It is but little known here, but is classed as a valuable meadow grass in Middle Europe and is recommended as an admixture for pastures on dry, thin soils. *Briza minor* is a smaller and more delicate annual species, also cultivated occasionally as an ornamental and for dry bouquets. *Briza maxima*, also an annual, is a larger ornamental species.

Brizopyrum siculum. (See *Desmazeria sicula*.)

Bromus ciliatus Linn. Swamp Chess; Fringed Brome-grass.

A native perennial of wide range, frequent in open woodlands, growing to the height of 3 to 5 feet. It is leafy to the top, and would doubtless make a hay grass of good appearance, although of somewhat inferior quality. No attempts have been made to cultivate it for agricultural purposes. It makes a vigorous early growth on good soils and is recommended for propagation in wooded parks and woodland pastures.

Bromus erectus Huds.

A native of southern Europe, northern Africa, and western Asia. In habit this grass resembles Hungarian brome-grass (*B. inermis*), but the panicle is less spreading

and the spikelets are awned. It is a perennial, and is regarded as an important grass for dry limestone regions.

Bromus inermis. Hungarian Brome-grass; Couch-Brome; Awnless Brome-grass; Austrian Brome-grass; Smooth Brome. (Fig. 21.)

An erect perennial, 2 to 5 feet high, with strong creeping rootstocks, and a loose open panicle, 4 to 6 inches long. A native of Europe introduced into this country by the Agricultural Experiment Station of the University of California about 1880 and gives considerable promise of value both for hay and pasturage. It is strongly stoloniferous, and quickly makes a thick, firm turf. It appears to have grown with equal vigor in Canada and in Tennessee, remaining green throughout the winter season in the latter State. The strong perennial character of this Brome-grass and its unusual drought-resisting powers are qualities which recommend it for general cultivation, particularly in the semiarid regions of the West and Northwest. It thrives well on dry, loose soil, but of course the better the soil the greater the yield. Its nutritive value is comparatively low, and before undertaking its cultivation the fact that it is somewhat difficult to eradicate when once established, although by no means so difficult as Couch-grass or Johnson-grass, should be remembered. In Europe it is classed among the best forage plants. The seeds are quoted in New York catalogues at from \$20 to \$22 per 100 pounds. A bushel weighs about 14 pounds. Sow three bushels to the acre if sown alone. In this country the yield of seed per acre has been 600 pounds, which at the prices named would make it a very profitable crop.

Bromus kalmii Gray. Wild Chess.

A perennial, native, 18 inches to 3 feet high, more or less frequent in dry, open grounds and borders of thickets, from Maine to Pennsylvania and westward to the Rocky Mountains. It is less common than *Bromus ciliatus*, and nothing is known of its agricultural value.

Bromus mango Desv.

A stout, tufted grass, about 2 feet high, in appearance closely resembling *B. secalinus*, native of the west coast of South America. Before the conquest and the subsequent introduction of European cereals, theseeds were the principal food grain of the natives of Chile and Peru.

Bromus mollis Linn. Soft Chess; Soft Brome-grass.

An erect annual, 1 to 3 feet high, having the sheaths, leaves, and spikelets of the erect panicle softly pubescent. It has a marked resemblance to Cheat, from which it differs in its more erect panicle and hairiness. It is a native of Europe, but has become widely disseminated in this country, although less common than Cheat and Smooth Brome-grass, but like these can only be regarded as a weed. It has, however, been recommended for cultivation on thin, sandy land where better grasses will not succeed. The retail price of seed as quoted in New York catalogues is \$13 per 100 pounds.



FIG. 21.—Hungarian Brome-grass. (*Bromus inermis*.)

Bromus pratensis. (See *Bromus erectus*.)

Bromus pumpellianus Scribn. Western Brome-grass.

A native of the Northwestern States in the Rocky Mountain region extending into Canada. In habit of growth it closely resembles Hungarian or Awnless Brome-grass (*B. inermis*) and is doubtless equally valuable. Prof. James Fletcher, who has cultivated this grass at the experiment station at Ottawa, Canada, says, "This is a very valuable grass, producing an abundance of leaves, continuing in flower for a long time, and giving a heavy aftermath."

Bromus racemosus Linn. Smooth Brome-grass; Upright Chess.

An introduced annual, 1 to 3 feet high, with more or less spreading and nodding panicles and smooth spikelets. This is a very common grass in cultivated fields and waste places, and is often mistaken for Chess, from which it differs chiefly in its



FIG. 22.—Chess. (*Bromus secalinus*.)

FIG. 23.—Rescue-grass. (*Bromus unioloides*.)

narrower panicles and straight awns, which are nearly as long as the flowering glumes. This grass has become very common in certain sections, particularly in the South. A field of it presents an attractive appearance, and the hay produced is of good quality.

Bromus schraderi. (See *Bromus unioloides*.)

Bromus secalinus Linn. Chess; Cheat; Willard's Brome-grass. (Fig. 22.)

A well-known weedy, annual grass, introduced into this country many years ago, and now common in grain fields and waste lands. The panicle is spreading and more or less drooping, and the awns of the flowering glumes are usually much shorter than the glumes themselves and more or less flexuose. The idea that Cheat or Chess is degenerated wheat has no foundation whatever in fact. Only Cheat seeds will produce Cheat, and it is certain that wherever these plants

appear they were preceded by Cheat seeds, which may have been introduced with the grain sown, or brought by birds or animals from other fields. Cheat and wheat are only remotely related; they belong to quite distinct tribes in the grass family and wheat is less likely to change into cheat in a single generation than the more nearly allied oats, or than wheat is to change into barley, with which it is very closely related.

Bromus unioloides Willd. Rescue-grass; Schrader's Brome-grass; Australian Oats; Australian Prairie-grass; Arctic-grass. (Fig. 23.)

This *Bromus*, which is a native of South America, and probably also of the extreme southwestern portion of the United States, is a strong-growing grass, with rather broad, much flattened, usually bearded spikelets. It grows to the height of 1 to 3 feet, and in the more vigorous plants the branches of the nodding panicle are widely spreading. It grows rapidly, seeds freely, and dies after seeding. If, by frequent mowing or close grazing, it is prevented from going to seed, its duration may be continued over two or three years. If the seeds are allowed to fall, as they frequently do when mature, young plants soon appear, and a fairly continuous growth of this grass may thus be maintained. In many parts of the Southern States, where it has been most cultivated, it has come to be regarded as one of the best winter grasses, as it makes its chief growth during the cooler months of the year. Sow in August or September, at the rate of 30 to 40 pounds to the acre.



FIG. 24.—Buffalo-grass.
(*Buchloë dactyloides*.)

Bromus willdenovii. (See *Bromus unioloides*.)

Buchloë dactyloides Engelm. Buffalo-grass; False Mesquit; Early Mesquit, Mesquit-grass. (Fig. 24.)

This is the true Buffalo-grass of the Great Plains region, which is reported to have been much more abundant and more widely distributed in times past than it is at present. Now, however, it is known to extend from the British Possessions southward into Texas, where it is considered an invaluable grass and one of the best constituents of sheep pastures. It has a low habit of growth, rarely more than 5 or 6 inches high, and produces numerous creeping and widely spreading branches or stolons, which root at the joints, each joint forming a new tuft, and in this way the grass often covers large areas with a close mat of fine-leaved herbage, which is greatly relished by all grazing animals. As a winter forage, it is without an equal. The habit of growth of this plant is very similar to that of Bermuda-grass, but the stems and leaves are much finer and the turf formed more compact. Live roots transplanted from Nebraska to the grounds of the



FIG. 25.—Blue-joint. (*Calamagrostis canadensis*.)

Department of Agriculture at Washington, D. C., have grown with remarkable vigor, and it may be possible to utilize this most palatable and nutritious grass in portions of the Eastern or Southern States.

Bulbilis dactyloides. (See *Buchloë dactyloides*.)

Calamagrostis arenaria. (See *Ammophila arenaria*.)

Calamagrostis brevipilis. (See *Calamovilfa brevipilis*.)

***Calamagrostis canadensis* Beauv.** Blue-joint-grass; Sand-grass; Red-top; Canadian Small-reed; Fowl Meadow-grass. (Fig. 25.)

A native grass common in the Northern and Northwestern States, extending clear across the continent, usually growing in moist meadows. The leaf stems are 3 to 5 feet high, and the open brown or purplish panicle has some resemblance to that of Red-top. Occasionally it is found occupying considerable areas to the exclusion of other grasses, and under such conditions it yields a large amount of excellent hay, highly prized by farmers and eaten with avidity by all farm stock. This grass grows naturally on low, moist meadows, and has succeeded well under cultivation. In the northern portion of the United States its more extended culture for hay is recommended.

***Calamagrostis coarctata*.** (See *Calamagrostis nuttalliana*.)

***Calamagrostis howellii* Vasey.** Howell's-grass.

This is a densely tufted, leafy grass, 1 to 2 feet high, native of Oregon and Washington. From its habit of growth it doubtless possesses some agricultural value, and is certainly worthy of experimental culture in the States where it is native.



FIG. 26.—Long-leafed Bent.
(*Calamovilfa longifolia*.)

***Calamagrostis longifolia*.** (See *Calamovilfa longifolia*.)

***Calamagrostis neglecta* Kunth.** Pony-grass.

A rather slender, erect perennial, with narrow leaves, and a contracted, densely flowered, brownish panicle 3 to 6 inches long. A native of Northern Europe and North America, ranging along our northern borders from Newfoundland and Maine to the Pacific, being most abundant in the Rocky Mountain region. Under experimental cultivation it has succeeded well. It is a productive grass, much liked by stock, especially horses, and is deserving a place among the cultivated species.

***Calamagrostis nuttalliana* Steud.** Reed Bent-grass; Wild oats.

A stout, reed-like grass, 3 to 5 feet high, not infrequent in low, moist grounds and swamps, ranging from New England southward to Tennessee. No attempts have been made to cultivate it, and little is known of its agricultural value. Probably of some use for low woodlands where grasses are desired for pasturage, and if it will thrive in the open it would make a most excellent hay-grass for low meadows.

***Calamovilfa brevifolia* Scribn.** Purple Bent.

This is a rather rare grass, apparently limited to the sandy swamps and pine barrens of New Jersey, but probably extends southward along the coast to Florida. It has rather hard, wiry stems 2 to 4 feet high, flat leaves and open, purplish, nodding panicle. Of no recognized agricultural value.

***Calamovilfa longifolia* Scribn.** Sand-grass; Woolly Bent-grass; Long-leafed Bent. (Fig. 26.)

A stout, long-leafed grass, 1 to 4 feet high, growing in sands or sandy soil along the shores of the Great Lakes and in the Missouri region of the West, extending southward to Kansas. Its very strong and far-reaching rhizomes or creeping "roots" make this an exceedingly valuable grass for binding drifting sands, or those subject to wash by swift currents or the beating of the waves. As a sand

binder for interior regions of the country this grass is probably unsurpassed. Its long, tough leaves suggest a possible value for paper-making.

Capriola dactylon. (See *Cynodon dactylon*.)

Cenchrus echinatus Linn. Cock-spur.

A rather stout annual, with branching culms 1 to 2 feet long, and dense heads or spikes made up of 20 or more globular, spiny burs containing the spikelets. It is a weed of the fields and waste places of the Southern and Southwestern States.

Cenchrus tribuloides Linn. Sand-bur; Sand-spur; Hedgehog-grass; Bur-grass; Cock-spur Bur. (Fig. 27.)

A widely distributed grass growing in sandy soils along river banks, the seashore, and more or less scattered throughout the interior of the country in sandy districts. It is one of the worst of annual weeds wherever it becomes abundant.



FIG. 27.—Sand-bur. (*Cenchrus tribuloides*.)

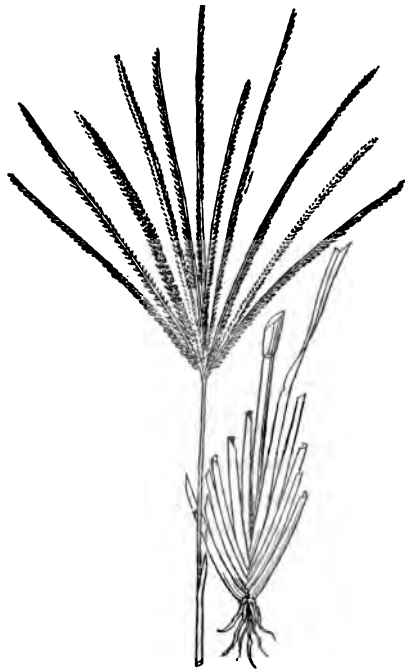


FIG. 28.—Smooth Chloris. (*Chloris glauca*.)

The prostrate branching stems are 1 to 2 feet long, and the spikes are composed of 10 to 15 strongly spiny burs, which readily become detached and adhere to passing objects. No pains should be spared in efforts to exterminate this grass wherever it makes its appearance.

Chamæraphis sp. (See *Setaria*.)

Chloris barbata Sw.

This and the very similar *C. elegans* of our Southwestern States and Territories are pleasing ornamental grasses, growing to the height of 1 to 2 feet, the main stem and branches being terminated by 3 to 10 bearded spikes, which impart to them a striking appearance and make them valuable ornamentals. *C. polydactyla*, a West Indian species which has been found in southern Florida, is equally

attractive, and has longer and more graceful spikes. *C. barbata* appears to be the only one generally cultivated, but there are several native species which are quite as ornamental. *C. gracilis*, a native of Central America and Mexico, is another species occasionally cultivated for ornament.

Chloris glauca Vasey. Smooth Chloris. (Fig. 28.)

A strong-growing grass, with diffusely spreading and ascending stems, 2 to 4 feet long, bearing 10 to 25 slender terminal spikes. Native of Florida, growing on brackish marshes and along the borders of cypress swamps. This is a handsome species, well deserving the attention of the florist, and although not at present recognized as possessing any agricultural value, it produces a large amount of comparatively tender herbage and may prove to be a desirable fodder plant for certain localities along the Gulf coast. It has made a good growth under cultivation on clayey soil at Washington, D. C.

Chloris petraea Swz. Seaside Finger-grass.

This somewhat ornamental grass is found in damp soil along the coast from Florida to North Carolina. It has clustered, erect stems, 1 to 2 feet high, which are terminated with 3 to 5 rather slender spikes. Of no recognized agricultural value, but it is as attractive as many of the grasses grown in the gardens as ornamentals.

Chloris verticillata Nutt. Branching Foxtail; Windmill-grass.

A low, spreading perennial, with upright flowering branches 6 to 20 inches high. The small awned spikelets are in slender spikes, which are crowded near the apex of the stems, and become widely-spreading at maturity. This grass is common in many places in central Texas, New Mexico, Arizona, northward to Kansas, and by some is spoken of very highly as an excellent grass for grazing, and one not easily tramped out. The arrangement of the spikes gives the grass an odd and somewhat pleasing appearance, making it of some use as an ornamental species for gardens. It is a good turf-former.

Chloropsis blanchardiana. (See *Trichloris blanchardiana*.)

Chrysopogon nutans. (See *Andropogon nutans*.)

Chrysurus cynosuroides. (See *Lamarkia aurea*.)

Cinna arundinacea Linn. Indian Reed; Wood Reed-grass; Sweet Reed.

A tall, leafy grass, 3 to 7 feet high, native and frequent in shaded swamps and damp woods, or along streams in wet meadows. For such places it may possess some agricultural value, as it yields a large amount of excellent hay where growing abundantly.

Cinna pendula Trin. Slender Reed-grass; Drooping Reed-grass.

This grass resembles the above somewhat, but is usually more slender, the more nodding panicles fewer flowered, and it is, for the most part, confined to moist woodlands in the Northern States.

Coix lachryma Linn. Job's Tears; Tear-grass; Corn-beads.

This grass is a native of southern Asia and is occasionally cultivated in this country for ornament or as a curiosity. It is cultivated for food by some of the hill tribes of India, and supplies a staple article of diet of the Tankhul Nagas of Manipur. The female flowers of this grass are inclosed in a nearly globular, capsule-like covering, which is very hard and becomes nearly white with age. In some countries these capsules are used for dress ornamentation and by the Catholics for rosaries. In China this grass is cultivated to some extent, because the fruit is believed to be valuable as a diuretic and antiphthisis. It is a hardy annual, 2 to 3 feet high, with broad leaves and a curious, nodding inflorescence. The "seeds" may be obtained from any of the leading seedsmen.

Ctenium carolinianum Panz. Toothache-grass; Lemon-grass. (Fig. 29.)

A perennial grass with erect stems 3 to 4 feet high. Native of the Southern States from Virginia southward, growing in the wet pine barrens, possessing no agricultural value, but rather curious in appearance. The strong rootstocks are lemon-scented and have a pungent taste.

Cynodon dactylon Pers. Bermuda-grass; Reed-grass; Scutch-grass; Dog's-tooth-grass; Wire-grass; Bahama-grass; Indian Couch-grass; Doab, Doorba or Doorva (in India); Couch-grass (in Australia). (Fig. 30.)

A grass widely dispersed over the tropical regions and warmer countries of the globe. It has a creeping habit of growth, extending over the surface of the ground and rooting at the joints. In poor soils the leaves are short and the upright flowering stems are only a few inches high, but on good land it grows to the height



FIG. 29.—Toothache-grass.
(*Ctenium carolinianum*.)

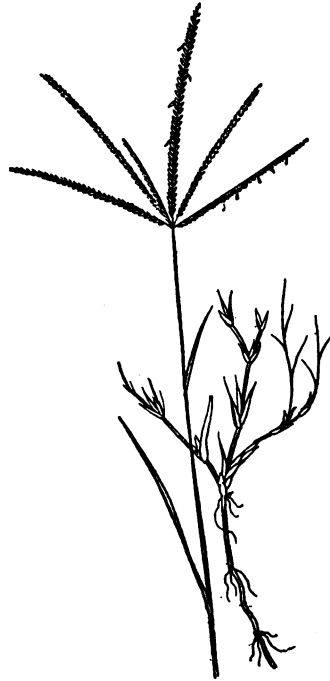


FIG. 30.—Bermuda-grass. (*Cynodon dactylon*.)

of 1 to 2 feet and yields a large amount of excellent hay. It may be cut three or four times during the season. In the Northern States it does not afford a profitable crop and is of little value for pasturage north of Virginia, but in the Southern States and in the warmer regions of the Southwest and on the Pacific Slope it is cultivated extensively and is most highly prized, chiefly for grazing, all kinds of stock being exceedingly fond of it. It grows freely on sandy soils where other grasses will not thrive, and resists extreme drought and high temperatures. It is particularly a sun-loving grass, and will not thrive in the shade. It is useful for binding drifting sands and the loose soil of embankments or those subject to wash. It makes a pleasing lawn grass, and is extensively used for this purpose in the hotter portions of the United States, for it will thrive where the grasses ordinarily employed for lawns could not survive. The

yield of hay under good conditions is from 3 to 4 tons to the acre, and as high as 10 tons to the acre have been produced under peculiarly favorable circumstances. While this grass will survive the winters of the latitude of Philadelphia, the leafage is very sensitive to cold and turns brown with the first frosts. This fact renders it objectionable as a lawn grass, except in regions where the winter season is very mild. In many portions of the Southern States there is probably no grass equal to Bermuda for summer pastures, and none which will better resist the trampling of stock. Bermuda does not mature seed except in the extreme southern portion of our country, but seed obtained from more southern latitudes is offered for sale by some of our leading seed dealers. The most direct and certain method of propagation is by transplanting, which may be effected by cutting up Bermuda turf into small pieces, scattering these along shallow furrows and covering them lightly. When once established, Bermuda grass is very persistent and difficult to eradicate, and it should not be introduced upon land which is likely to be used for other crops. New York catalogues quote the seed at \$1.25 to \$1.50 per pound, retail.



Fig. 31.—Crested Dog's-tail. (*Cynosurus cristatus*.)

***Cynosurus cristatus* Linn. Crested Dog's-tail. (Fig. 31.)**

A slightly tufted perennial grass, 1 to 2 feet high, with fine and chiefly radical leaves. It is a native of Europe and is adapted to cultivation in moist, temperate regions, and has been sparingly introduced into this country. On moist, rich land it is fairly productive, but it is rarely sown alone, excepting for seed or the formation of lawns, for which latter purpose it is well adapted, as it forms a low and compact sward when

thickly sown. It is said to thrive well in the shade, a fact which gives it importance to those desiring to form a lawn under shade trees. It forms a good bottom grass, has a highly nutritive value, and is recommended for all mixtures used for permanent pastures, especially in hilly regions. The mature stems of this grass are among the most valuable of those used in the manufacture of Leghorn hats. Price of seed in New York, 40 cents per pound, or \$7.35 per bushel, which weighs about 21 pounds.

***Dactylis glomerata* Linn. Orchard-grass; Rough Cock's-foot. (Fig. 32.)**

This is one of the best known and among the most popular of our cultivated grasses. It will grow well on any soil containing a reasonable amount of fertility, excepting that which is very wet. It is a hardy grass and may be grown successfully anywhere in the United States, except in the extreme South and in the arid regions of the West. It yields an abundant crop of excellent hay and may be sown alone for this purpose, but owing to its habit of forming tufts or tussocks, the land should be seeded heavily or the seeds should be mixed with



Fig. 32.—Orchard-grass. (*Dactylis glomerata*.)

other sorts, to act as fillers. It is a good pasture grass, especially for open woodlands, and affords excellent grazing earlier than almost any other species. The aftermath is unequaled in amount by any of the grasses ordinarily cultivated for hay. When sown with other grasses, the tendency of Orchard-grass to form tussocks is much diminished and the sward greatly improved. Heavy rolling is also recommended for checking or preventing the tufted growth which this grass naturally assumes. By this operation the tufts are pressed down to the level of the other grasses and the turf becomes more uniform. In old, rich meadows of Orchard-grass it is advisable to harrow in the spring and afterwards use the roller. Its best record of yield, made by Sinclair, was 27,905 pounds green, 11,859 pounds of hay, and 11,910 pounds of aftermath per acre. Sow 3 to 4 bushels to the acre. Price of seed, as given in New York catalogues, \$2 to \$2.50 per bushel, which weighs about 14 pounds.

Dactyloctenium ægyptiacum Willd. Crow-foot-grass; Egyptian-grass; Ah-ke-ti (Mohave Indians). (Fig. 33.)

This grass, which is a weed throughout all the warmer countries of the world, has become quite common in some of the Southern States. It closely resembles the more common Goose-grass or Duck's-grass (*Elyusine indica*), from which it differs chiefly in having the terminal spikes shorter and each tipped with a sharp prolongation of the axis. It is usually found in cultivated fields, and often in such abundance as to displace the less vigorous native sorts, and is sometimes cut for hay. In parts of Africa where this grass is common a decoction is prepared from the seeds, which is used for inflammation of the kidneys. In Australia it is valued for pasture, and in India the grain is sometimes used for food by the natives in times of scarcity. The Mohave Indians of California also use the grain for food, grinding it and making the flour into cakes or mush. (C. R. Orcutt.)



FIG. 33.—Crow-foot grass. (*Dactyloctenium ægyptiacum*.)

Danthonia californica Boland. California Oat-grass.

A native of the Rocky Mountain regions and Pacific Slope, growing from 1 to 3 feet high. The largest, most leafy, and handsomest of our American species of *Danthonia*, often forming a considerable element of the forage of the so-called deer parks of the mountains and foothills. Nothing is known of its agricultural value.

Danthonia compressa Austin. Tennessee Oat-grass; Mountain Oat-grass.

A slender, erect, tufted perennial, usually growing to the height of about 2 feet, with long and narrow root-leaves, and few-flowered spreading panicle. It is a common grass in the hilly regions of New England and the Middle States, and extends southward into North Carolina and Tennessee along mountains, where it forms the chief bulk of the forage of the so-called "balds" or parks which are common to mountains in the South. It is highly nutritious, as determined by chemical analysis, as well as by its effect upon the stock grazing upon it. It

stands well the trampling and grazing of both horses and cattle, but sheep are too close feeders, and where these range it soon disappears.

***Danthonia cunninghamii* Hook. f.**

A large tussock grass of New Zealand, growing from sea level to an altitude of 2,500 feet. It has rather stout stems 3 to 6 feet high, and large, nodding panicles 10 to 18 inches long. A strikingly handsome ornamental grass, affording a large amount of coarse fodder. It is of value in the manufacture of paper. (Kirk.)

***Danthonia flavescens* Hook. f. Yellow Tussock; Snow-grass.**

A stout grass 3 to 5 feet high, with leaves 3 to 4 feet long, and open panicles 10 to 18 inches long. Found only in New Zealand, growing chiefly in the mountain districts. It is rather coarse for fodder, but serves for winter grazing, and the leaves are largely used in paper mills and for thatching (Kirk). The leaves of the less robust *D. raoulii*, also a native of New Zealand, are used for similar purposes.

***Danthonia pilosa* R. Br.**

A slender and rather rigid tufted perennial 1 to 2 feet high, with very narrow or filiform leaves and contracted panicles 2 to 3 inches long. A native of New Zealand and Australia. Mr. T. Kirk says of this grass that it is excellent for mixed pasturage, forming a compact turf. It is very hardy, of rapid growth after cropping, and affords a good yield of nutritious herbage.

***Danthonia semiannularis* R. Br. Wallaby-grass.**

A somewhat variable grass, 2 to 3 feet high, native of Australia, occurring both in the coastal districts and in the arid interior. It is a perennial and is said to be one of the most nutritious grasses of Australia, stock of all kinds being remarkably fond of it. If cut when just coming into flower it makes good hay. It grows on a great variety of soils, but is most productive on moderately rich, strong loams. It seeds freely, and the grain is easily harvested.

***Danthonia sericea* Nutt. Silky Oat-grass; Taller Wild Oat-grass; Silky-flowered Oat-grass.**

This is a rather stout, erect grass, 1 to 3 feet high, with usually pubescent sheaths and rather rigid leaves. It ranges from Massachusetts southward to Tennessee and North Carolina in the mountain regions, where it occurs along the lower foothills and crests of the higher ridges. It grows in isolated tufts, and is comparatively rare. Of no agricultural value.

***Danthonia spicata* Beauv. Wild Oat-grass; White-top; Old Fog; June-grass; Poverty-grass. (Fig. 34.)**

This is our most common species of *Danthonia*, extending from Canada southward to the Gulf of Mexico. It grows in dry and sterile or rocky soil, and its presence is usually indicative of impoverished lands. In New England it frequently occupies neglected fields, as broom sedge does in the South. It is a grass of no agricultural value.

***Danthonia unispicata* Thurb. Mountain Oat-grass.**

This is a low grass, 6 inches to a foot high, usually associated with California Oat-grass, being found to similar regions, where it helps to make up the herbage of the mountain meadows and parks.

***Deschampsia cæspitosa* Beauv. Tufted Hair-grass; Hassock-grass.**

A native perennial, ranging from New England to Pennsylvania, and westward to the Pacific Coast. It yields an inferior, coarse, harsh forage, and is not eaten by stock except when young. It has a record of producing 10,209 pounds green and 3,318 pounds dry hay per acre. Johnson, in his work on British grasses, says of the tendency of Tufted Hair-grass to form tussocks: "In the economy

of nature these tufts, so unsightly and disfiguring to the landscape, are valuable by contributing to elevate and solidify low lands liable to be overflowed by rivers, and where they occur on hill and mountain slopes, by binding the spongy soil and preventing the slips which would leave them bare." This grass is most abundant in the Rocky Mountain region, where it doubtless serves to a considerable extent the purpose here mentioned. In England it is sometimes used by the farmers to make door mats. In Germany it furnishes the "Lime-grass" used in upholstery. Price of the seed in New York, \$22 per 100 pounds.

***Deschampsia cæspitosa* var. Rocky Mountain Hair-grass.**

An ornamental grass like the last (*D. cæspitosa*), growing in tufts, but bearing fewer flowering stems and many more and longer (18 inches) dark-green leaves. After cutting, on August 5, new leaves were thrown up so quickly that in one week the plot was green again. (James Fletcher.)



FIG. 34.—Wild Oat-grass.
(*Danthonia spicata*.)

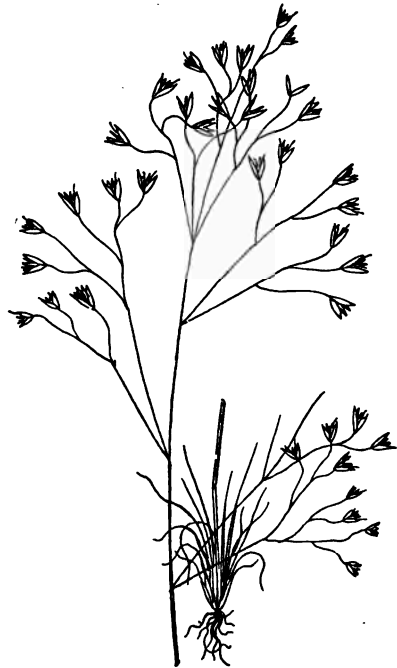


FIG. 35.—Tufted Hair-grass. (*Deschampsia flexuosa*.)

***Deschampsia flexuosa* Griseb. Tufted Hair-grass; Wood Hair-grass. (Fig. 35.)**

A slender perennial grass, 1 to 2 feet high, with numerous very fine root-leaves and a delicate capillary panicle. It grows in tufts like *Deschampsia cæspitosa*, and is more common in the Eastern States than that species, but is even less valuable for meadows. It is, however, of some value for woodland pastures, as it will grow very well in the shade. It extends southward along the mountains into North Carolina and Tennessee. Its range westward is limited. It has a record of producing 12,209 pounds of green, and 3,318 of dry hay per acre. The price of seed quoted in New York catalogues is \$15 per 100 pounds.

***Desmazeria sicula* Dum.**

A native of the Mediterranean region, frequently cultivated for ornament. Used for edging.

Deyeuxia. (See *Calamagrostis*.)

Deyeuxia canadensis. (See *Calamagrostis canadensis*.)

Diarrhena americana Beauv. Twin-grass.

An erect native perennial, 2 to 3 feet high, with long, rather broad, nearly erect leaves, and few-flowered, simple panicles, 4 to 10 inches long. This grass grows along shady river banks and in rocky woods from Ohio to Illinois and southward. Of no agricultural value.

Diplachne fascicularis Beauv. Spike-grass.

An annual, 2 to 3 feet high, ranging from New England southward, and westward to Arizona. It is chiefly confined to brackish marshes or wet lands near the coast, and low, more or less alkaline regions in the interior. Of no recognized agricultural value.



FIG. 36.—Salt-grass. (*Distichlis maritima*.)



FIG. 37.—Yard-grass. (*Eleusine indica*.)

Distichlis maritima Rafin. Salt-grass; Alkali-grass; Spike-grass; Quack-grass. (Fig. 36.)

An upright, wiry grass, 10 to 20 inches high, with strong, extensively creeping root-stocks. Common along the coast on both sides of the continent, and abundant in the alkaline regions of the interior, where it is often found covering considerable areas to the exclusion of other grasses. It thrives even in ground heavily crusted with alkali and other salts sufficient to destroy almost any other kind of vegetable growth. Prospectors and miners consider its presence a sure sign of water near the surface, and when crossing the desert select spots where it grows to dig for water (Orcutt). In farming lands it is deemed a nuisance, for its tough, matted roots make a sod almost impossible to break up with a plow. Although sometimes eaten by stock in the absence of better sorts, it has

little agricultural value. It is a good grass for binding loose sands or soils subject to wash.

Eatonia obtusata Gray. Early Bunch-grass; Prairie-grass.

A tufted perennial, 1 to 2 feet high, with flat leaves and rather densely flowered nodding panicles. This is a native species, growing usually in moist soil, and ranging from New York to California and southward. A tender grass, readily eaten by stock, which, when abundant, supplies considerable native forage of good quality.

Eatonia pennsylvanica Gray. Eaton's-grass.

A slender, pale-green perennial, not infrequent in moist meadows in the States of the Atlantic Slope. Tender and nutritious, and well adapted for cultivation in moist meadows.

Eleusine ægyptiaca. (See *Dactyloctenium ægyptiacum*.)

Eleusine coracana Gärttn. African Millet; Ragi Millet; Korakan, Dagassa, and Mandua are Indian names for this grass.

An erect annual grass, 2 to 4 feet high, closely related to and much resembling our common crowfoot (*Eleusine indica*), but of rather stouter habit and with larger spikes and seeds. It is cultivated in India, southern China, Japan, and in many parts of Africa for the grain, which is used as food. It forms the principal food of many African tribes. In spite of the bitter taste of the flour, a kind of bread or unleavened cake is made of it. Beer is brewed from the grain in Abyssinia. Said to yield good crops, even on very poor soil, and may be cultivated in the same way and for the same purposes as millet. The seeds are marked with very fine, comb-like lines.

Eleusine indica Gärttn. Goose-grass; Dog's-tail-grass; Yard-grass; Crow-foot-grass; Wire-grass; Crab-grass; Crop-grass; Dog's-tooth-grass; Buzzard-grass; Dutch-grass. (Fig. 37.)

A coarse, tufted annual, with erect or spreading stems 6 inches to 2 feet high; spikelets arranged in a number of spikes which are clustered at the top of the stem. This grass is distributed throughout the warmer countries of the globe, and is particularly abundant in the Southern States, growing in cultivated grounds about dwellings, etc. It has somewhat wiry, flattened stems, many springing from a single root, and rather thick leaves. Some authors have spoken of it as being nutritious and good for grazing or soiling, and for hay, but it is more generally regarded as a weed, and often a troublesome one in door-yards or lawns.

Elionurus hirsutus Munro.

A perennial grass with rigid stems 1 to 2 feet high and slender, silvery-hairy terminal spikes. A characteristic desert-grass of northwest India. It yields a fodder for elephants, and the seed, mixed with bajra flour, is largely consumed by the natives. (Duthie.)

Elymus arenarius Linn. Sea Lyme-grass; Upright Sea-Lyme-grass. (Fig. 38.)

A stout, coarse grass, 2 to 8 feet high, with strong, creeping rootstocks, smooth stems, long, rigid leaves, and dense terminal spikes 6 to 12 inches long. The spikelets are about an inch long and three to four flowered. This grass is common along the seacoast of northern Europe, our north Atlantic coast, and on



FIG. 38.—Upright Sea-Lyme-grass. (*Elymus arenarius*.)

our Western shores from Santa Cruz, Cal., northward to within the Arctic zone. It is one of the best grasses known for binding the drifting sands of the coast and in northern Europe has been cultivated along with Beach-grass for this purpose. These two grasses, when combined, seem admirably adapted for the purpose of forming a barrier to the encroachment of the sea; the sand that Beach-grass arrests and collects about itself the Lyme-grass secures and holds fast. The seeds are used for food by the Digger Indians of the Northwest, and as the grass springs up around their deserted lodges it is called by the settlers "*Rancheria*" grass. This Lyme-grass is usually regarded as possessing little or no forage value, but in very moist climates or under certain favorable conditions it may yield a valuable fodder, for when young the grass is tender and nutritious.

***Elymus canadensis* Linn.** Wild Rye; Terrell-grass; Canada Lyme-grass.

A rather stout, smooth perennial, 3 to 5 feet high, with broad, flat leaves, 6 to 12 inches long. The bearded spikelets are arranged in a terminal spike or "head," which has some resemblance to a head of rye. Common in low thickets and along streams in rich, open woods throughout the country. It has no recognized agricultural value, but its cultivation is evidently worthy of trial, for if it could be successfully grown its yield of hay would be large, and from appearances the hay would be of good quality.



FIG. 39.—Terrell grass.
(*Elymus virginicus*.)

***Elymus condensatus* Presl.** Giant Rye-grass; Rye-grass; Western Rye-grass.

The largest of the native Rye-grasses, growing to the height of 5 to 10 feet. Common in the Rocky Mountain regions and on the Pacific Slope, usually growing along rivers or streams, the banks of which are protected and held together by the strong, spreading rootstocks of the grass. This grass is useful for holding the sand on railway banks, etc. When young, this grass makes excellent hay, and when allowed to stand it affords a considerable amount of fodder for stock on the winter ranges.

***Elymus hystrix*.** (See *Asprella hystrix*.)

***Elymus mollis* Trin.** Soft Sea Lyme-grass.

A grass which closely resembles and has the same habit of growth as *Elymus arenarius*. It is distinguished by having the stem soft-downy just below the head or spike and in having five- to seven-flowered spikelets, the outer glumes of which are broader and five- to seven-nerved. This grass occurs along the shores of the Great Lakes and northward on both the Atlantic and Pacific coasts.

***Elymus striatus* Willd.** Dennett-grass; Slender Hairy Lyme-grass.

A slender perennial, 2 to 3 feet high, with bristly, nodding spikes or heads. A native grass found in moist thickets, along streams, etc. Of no recognized agricultural value.

***Elymus triticoides* Nutt.** Wild Wheat; Wild Rye.

By some this has been regarded as a small, reduced form of *Elymus condensatus*, mentioned above. It grows to the height of 2 to 3 or 4 feet and is native of the Rocky Mountain region and Pacific Slope, extending eastward nearly to the Mississippi. While it is a grass of good appearance and possibly of some agricultural value, no attempts have been made to cultivate it.

Elymus virginicus Linn. Lyme-grass; Smooth Rye-grass; Terrell-grass; Wild Rye; Virginia Lyme-grass. (Fig. 39.)

The most common of our native species of Lyme-grasses, growing along streams, the borders of woods and thickets, more rarely in the open ground. It is an erect, smooth grass, 2 to 3 feet high, with rigid terminal spikes, which are often partly included within the upper leaf sheath. This grass has the appearance of possessing some agricultural value, but forms no turf, and by the time it blooms all the lower leaves are usually dead. When young it doubtless possesses some value as a native pasture grass.

Epicampes rigens Benth. Deer-grass. (Fig. 40.)

A stout, erect grass, 3 to 4 feet high, with rigid, wiry stems, and a very long, narrow, densely flowered, spike-like panicle. This grass is not uncommon in Arizona, southern California, and New Mexico, growing in sandy soil. It is regarded as one of the best native dry-land grasses, and is closely grazed wherever stock can get at it. The roots of *Epicampes macroura*—Mexican Broom-root or Mexican Whisk—are used in making brushes and are exported from Vera Cruz to Europe for this purpose.

Eragrostis abyssinica Link. Teff.

A branching, leafy annual, 2 to 4 feet high, with widely spreading capillary panicles of many spikelets. This grass grows readily from seed, which is produced abundantly, and it may be of some value for hay in parts of the South or Southwest. In northeastern Africa, where the grass is apparently native, the grain is extensively used for food, being made into bread, which possesses a slight but agreeable acid taste. There are two varieties cultivated, a white and a red variety, the former being much superior to the latter and used only by the higher classes. It is sometimes grown in gardens for the elegant panicles, which are used in bouquets. A species of *Eragrostis*, possibly *E. neo-mexicana* Vasey, with the general habit of growth of Teff, occurs in New Mexico, springing up after rains, particularly in the region about Silver City, where it is called "Crab-grass." It is an annual, growing to the height of 2 to 4 feet, with widely spreading, many-flowered panicles, and is largely cut for hay.

Eragrostis amabilis. Love-grass.

A native of India, closely related to Candy-grass (*Eragrostis minor*). Cultivated sometimes in gardens for bouquets.

Eragrostis ciliaris Link.

A low, much-branched species with narrow, densely flowered, almost spike-like panicle. Florida to Mexico and South America. This and *E. plumosa*, which has open panicles and is of rather more slender habit, are pretty little ornamental species which might be cultivated for bouquets.

Eragrostis cynosuroides R. & S.

A rather stout, leafy perennial, 1 to 3 feet high, with narrow, spike-like panicles and rather large spikelets, common in northern India. Although a hard grass, it is sometimes used as fodder, mixed with gram (*Cicer arietinum*) and wheat, when other grasses fail. It produces a strong fiber which is much used for making ropes. This grass is considered sacred among the Brahmins. It is often spread



FIG. 40.—Deer-grass. (*Epicampes rigens*.)

beneath the dead bodies of Hindoos, the chief mourner wearing a ring of it on his finger. The stout rhizome is used as a diuretic. (Duthie.)

***Eragrostis elegantula* Kunth.**

A smooth, annual grass, 1 to 3 feet high, native of northwest India, growing in low, swampy grounds. It yields palatable fodder, and in the central provinces at Balaghat it is used for brooms.

***Eragrostis frankii* Meyer. Short-stalked Meadow-grass.**

A low, tufted annual, 3 to 10 inches high, rather common in the Central and Southern States, growing in low, sandy ground along streams, marshes, or ponds. When fresh it has a very strong, disagreeable odor, which serves at once to distinguish it. It has no agricultural value.

***Eragrostis major* Host. Stink-grass; Pungent Meadow-grass. (Fig. 41.)**

A rather showy, much-branched annual, with erect or ascending stems, 6 inches to 2 or 3 feet high. This species, which is a native of Europe, has become widely distributed in this country, growing chiefly in cultivated or waste grounds, especially in light soils. When fresh it emits a strong, unpleasant odor.



FIG. 41.—Stink-grass. (*Eragrostis major*.)

***Eragrostis minor* Host. Candy-grass; Strong-scented Meadow-grass; Stink-grass.**

This grass closely resembles *Eragrostis major*, but is smaller throughout, having narrower, usually fewer-flowered spikelets. It grows in similar situations as the last, but is less common.

***Eragrostis pectinacea* Gray. Meadow Comb-grass.**

An erect perennial, 1 to 2 feet high, with large, widely-spreading panicles, 6 inches to a foot or more in length. A native grass, common in dry, sandy soils in open grounds and along the borders of fields and woods in the Eastern, Southern, and Middle States. The showy panicles are often gathered for dry bouquets. Of no agricultural value.

***Eragrostis pilosa* Linn. Slender Meadow-grass.**

A slender branching annual, 6 to 18 inches high, with narrow, flat leaves and capillary, open panicles. This grass is widely distributed throughout the subtropical and warmer temperate regions of both hemispheres. In this country it has received no attention or is regarded as little more than a weed, but in Australia and India it is spoken of as being an excellent fodder grass, and the seeds are eaten by the natives of Ajmere, India.

***Eragrostis purshii* Schrad. Southern Spear-grass; Southern *Eragrostis*.**

A native annual, similar in appearance to *Eragrostis pilosa*, and growing in similar situations. It is common from the Middle States southward, and extends southward into Texas and Arizona, where it exists in a great variety of forms. It grows to the height of 1 to 2 feet. It is nowhere considered of any agricultural importance.

***Eragrostis reptans* Nees. Creeping Meadow-grass.**

A prostrate, much-branched and extensively creeping annual, common along sandy river banks, lake shores, and in marshy places. It sends up flowering stems 3

to 6 inches high, and from its habit of growth often presents a moss-like appearance. Of no agricultural value.

Eragrostis tenuis Gray. Branching Spear-grass.

This is a tall perennial western species 3 to 4 feet high, with long, open panicles and rather rigid leaves, which are 18 inches to 2 feet long. It grows in sandy soil in scattered tufts. Of no agricultural value.

Eremochloë. (See *Blepharidachne*.)

Erianthus ravennæ Beauv. Plume-grass.

A stout grass growing to the height of 8 or 10 feet, with large and plume-like panicles 10 to 20 inches long, resembling in some degree Pampas-grass. Cultivated for lawn decorations, as is also the variety with variegated leaves. A native of the Mediterranean region.

Erianthus saccharoides Michx. Plume-grass; Woolly Beard-grass; Foxtail.

A tall, stout grass of striking appearance, 4 to 6 feet high, with a reddish or silvery-white showy panicle from 5 to 10 inches long. This grass ranges from New Jersey to Illinois and southward to the Gulf, growing in very wet places and open swamps. Of no agricultural value, but deserves notice as an ornamental grass for lawns and gardens.

Eriochloa aristata Vasey. Mexican Everlasting-grass.

A branching leafy annual, 2 to 3 feet high, native of Mexico. Seed of this grass was obtained by the Department in 1888, and it was cultivated in the grass garden located at Starkville, Miss., by Prof. S. M. Tracy, who says that it is a much more promising grass than *E. annulata*, more hardy, less injured by drought, and produces a heavier growth. It will make two good crops of hay annually in the South, the best crop being from the second growth, which is ready to cut in October. The grass produces an abundance of seed and reseeds itself, making its production comparatively inexpensive.

Eriochloa punctata Hamilt. Everlasting-grass; Early Spring-grass.

A quick-growing, smooth, succulent perennial, 2 to 3 feet high, with flat leaves and narrow panicles 2 to 4 inches long. Widely distributed within the tropical and subtropical regions of both hemispheres. In Australia it is regarded as an excellent pasture grass, lasting all the year round and well liked by stock. The seed, which is produced abundantly, is easily gathered. This grass deserves the attention of Southern dairymen. In Arizona it grows throughout the valleys in irrigated soil, or in the rich, moist places of the plains, yielding abundant herbage eagerly sought by all kinds of stock.

Eriocoma cuspidata. (See *Oryzopsis membranacea*.)

Euchlæna luxurians. (See *E. mexicana*.)

Euchlæna mexicana Schrad. Teosinte; Guatemala-grass.

A stout, leafy annual grass, 8 to 10 or 12 feet high, resembling Indian corn, to which it is botanically closely related. The variety *E. luxurians*, of the seed catalogues, which has been cultivated in various parts of the South and West, has a habit of tillering, or sending up many—20 to 50—stalks from the same root. From this habit the bulk of fodder produced to the acre is very large, probably unequalled by any other grass. It is liked by all kinds of stock, and has especial value as a green fodder when other forage is dried up. It may be cut several times during the season, but nearly as good results will be obtained from a single cutting, made before there is any frost. The stalks are tender, and there is no waste in the fodder when dry or green. One pound of seed to the acre, planted in drills 3 feet apart and thinned to a foot apart in the drill, is recommended. It is a native of the warmer portions of Mexico and Central America. The seed rarely matures north of southern Florida.

Eulalia japonica. (See *Miscanthus sinensis*.)

Eustachys petraea. (See *Chloris petraea*.)

Festuca duriuscula Lam. Hard Fescue; Tall Sheep's Fescue.

A slender, densely tufted perennial grass, 1 to 2 feet high, with numerous very fine radical leaves and open panicles. This is one of the forms of Sheep's Fescue, and is of little value except in pastures. Its particular merit lies in its ability to thrive on dry, sandy soils unfit for the growth of better grasses, and it well resists long periods of summer drought. It is well adapted to the cooler and mountainous regions of our country, being a native of the cooler temperate regions of both hemispheres. On well-manured, clayey land this Fescue has produced upon a single acre 18,376 pounds of green hay at time of flowering, and 8,269 pounds of hay besides 10,029 pounds of aftermath. It possesses some value

as a lawn grass, but if used for this purpose it should be sown thickly and unmixed with other sorts. Sow $2\frac{1}{2}$ to 3 bushels to the acre. Price of seed in New York markets, \$16 to \$18 per 100 pounds.



FIG. 42.—Reed Fescue. (*Festuca elatior* var. *arundinacea*.)

Festuca elatior Linn. Tall Fescue; Tall Meadow Fescue; English Blue-grass; Randall-grass; Evergreen-grass.

This grass has been widely cultivated in this country, having been introduced from Europe, and has become thoroughly naturalized. It is an exceedingly valuable grass either for mowing or pasture. It is productive on soils which are not too dry, and being of long duration, is especially valuable for permanent pastures. It thrives best on moist soils rich in humus, whether marls or clays. The variety *pratensis* is a common form, rather smaller than the species, with a narrower and fewer-flowered panicle. Variety *arundinacea* (fig. 42) is a very vigorous, tall form, 3 to 4 feet high, exceedingly hardy, and yields a very large amount of hay of excellent quality, succeeding best on lands that are comparatively moist. The seed of Meadow Fescue is quoted in some of the New York catalogues at \$3.50 per bushel or \$22 per 100 pounds. A bushel weighs about 14 pounds.

Festuca glauca Hort.

A low grass, similar in its habit of growth and botanically closely resembling *Festuca ovina*, and by many authors regarded merely as a variety of that species. Owing to its pale, glaucous color and densely tufted manner of growth, it makes an attractive plant for edgings and is much used for that purpose by florists.

Festuca heterophylla Lam. Various-leaved Fescue.

A rather slender European grass, 2 to 4 feet high, with very narrow (setaceous) radical leaves, and narrow but flat culm leaves. It is a perennial, closely related to creeping Fescue, of which it has been made a variety by some authors. The panicle is comparatively large, open and nodding at the apex. It is a species preferring a rather mild climate and grows naturally in open woodlands or along their borders. It makes its best growth on low-lying lands which are not too dry, but upon good soil it withstands very well protracted periods of

drought. Owing to the great production of fine root leaves, this species makes a good bottom grass, and as these leaves are quite soft the grass is well adapted for lawns, and is particularly recommended for those which are too much shaded for the successful growth of other lawn grasses. It is an excellent grass, also, for woodland parks where the soil is not sandy, and European authorities have classed it with the best forage plants. It is little known in this country, but the seed is offered for sale by our leading seedsmen, the retail price being from \$2.50 to \$3 per bushel of about 14 pounds.

***Festuca littoralis* Steud.**

A native of the seacoasts of Australia and New Zealand. It is a hardy grass, 1 to 3 feet high, with erect, rigid leaves and narrow panicle 3 to 10 inches long. It is found only upon the loose sand, and is of no value for fodder, but the tough, fibrous herbage is excellent for paper making, and the densely tufted habit of growth renders the species useful for binding drifting sands.

***Festuca microstachya* Nutt. Western Fescue; Small Fescue.**

This is a low native annual species of the Rocky Mountain region and the Pacific Slope. It has no agricultural value.

***Festuca nutans* Willd. Nodding Fescue.**

A native grass, 1 to 4 feet high, with a loosely flowered, nodding panicle and perennial root. It is found in moist, open woods and along thicket borders. It has no recognized agricultural value.

***Festuca ovina* Linn. Sheep's Fescue; Piñon-grass (in Nevada); Pine Bunch-grass.**

Sheep's Fescue exists in many varieties in the Northwestern States, especially in the Rocky Mountain regions. Some of these varieties attain the height of 2 or 3 feet, but for the most part they are rarely more than a foot high, producing a large amount of fine herbage, which is valuable for grazing, especially for sheep. Some of the native varieties are well worthy the attention of the agriculturist. All the forms of *Festuca ovina* are "bunch-grasses," and are devoid of the creeping roots, the presence of which distinguishes the Red Fescue (*Festuca rubra*) from this species. Sheep's Fescue is well adapted for cultivation on light, dry soils, especially those which are shallow and silicious. Although a native of this country, our seed supply comes mostly, if not entirely from Europe, where the grass is also native. Sow $2\frac{1}{2}$ to 3 bushels per acre. The weight of a bushel of seed is about 14 pounds. Price per bushel \$2.25 to \$2.75.



FIG. 43.—Tennessee Fescue. (*Festuca rubra* var. *glaucescens*.)

Price per bushel

***Festuca pratensis*. (See *Festuca elatior*.)**

***Festuca rubra* Linn. Red Fescue; Creeping Fescue.**

This grass grows along the Atlantic coast of the New England and Middle States, and in the Northern States, extending westward to the Pacific. Like *Festuca ovina*, it presents many forms, but in some respects is superior to that species, as by its creeping rhizomes it will form a compact and durable turf. On account of this habit of growth, it is a useful grass for binding moving sands along the seacoast, or covering gravelly banks and dry slopes. In Germany, Red Fescue is regarded as one of the most valuable grasses for dry, sandy meadows and

pastures. A vigorous-growing variety of *Festuca rubra* (var. *glaucescens*) (fig. 43) grows in Tennessee, where it remains green throughout the year, being little affected by drought or severe winter weather. This form grows to the height of 1 to 2 feet, and has a great mass of fine and long root leaves, and may be recommended for pastures, especially upon worn-out soils and hilly slopes. Some of the varieties which are native in the Rocky Mountain region attain the height of 2 feet, and in the mountain parks and on the foothills they often cover areas of considerable extent with a beautiful and continuous turf, yielding pasturage of most excellent and nutritive quality. Sow $2\frac{1}{2}$ to 3 bushels of seed per acre. A bushel weighs about 14 pounds. Price, about \$2.75 per bushel.

***Festuca scabrella* Torr.** Buffalo Bunch-grass; Great Bunch-grass. (Fig. 44.)

A strong perennial, growing in large tufts or bunches 1 to 3 or 4 feet high. A native of the Rocky Mountain regions, extending from Colorado northward and westward to California and Oregon. It often occupies extensive mountain parks, to the exclusion of other grasses, where it affords excellent grazing. It may be cut for hay, of which it furnishes a large amount, excellent in quality, especially for horses. It is one of the best grasses for winter stock ranges. In the Northwest, particularly in the Rocky Mountain region, there are many native species of the genus *Festuca* which are well deserving the attention of stockmen and farmers.



FIG. 44.—Buffalo Bunch-grass.
(*Festuca scabrella*.)

***Festuca tenella* Willd.** Slender Fescue.

This is a low, annual species, 6 to 18 inches high, growing in poor, sandy soils in nearly all parts of the country. It possesses no agricultural value.

***Festuca tenuifolia* Sibth.** Slender Fescue.

A low and fine-leaved grass, in habit of growth resembling *Festuca ovina*, of which it is regarded as only a variety by most authors. It has no special agricultural value, but will grow in dry and comparatively sterile soil. Its fine, hair-like leaves and densely caespitose habit of growth render it a good lawn grass when properly treated, especially for shady places, and it is also a good plant for edgings.

***Festuca unioides*.** (See *Bromus unioides*.)

***Gastridium australe* Beauv.** Nit-grass.

A showy, annual grass introduced into this country from Europe. It is cultivated for ornament only. On the Pacific Slope it has escaped from cultivation and has apparently become naturalized in many places.

***Glyceria aquatica* Smith.** Reed Meadow-grass; White Spear-grass; Water Meadow-grass.

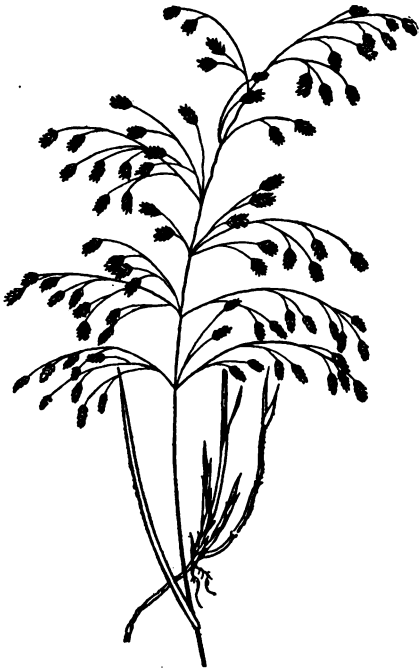
A stout, erect, leafy perennial, 3 to 4 feet high, with long, rather broad leaves, and a large, nodding panicle. It is common in the northern Middle States and southward along the mountains to Tennessee and North Carolina, extending westward to the Rocky Mountain region. It grows along streams and in moist meadows, and in such places often forms a considerable portion of the native hay. It is liked by cattle and is a good pasture grass for wet lands.

***Glyceria canadensis* Trin.** Rattlesnake-grass; Tall Quaking-grass. (Fig. 45.)

A grass similar in habit to the last and growing in similar situations in the Northern States, extending southward to Pennsylvania and westward to Kansas. It is less common than *G. aquatica*, and has received no attention by the agriculturist. The nodding panicles of rather large spikelets are sometimes gathered for dry bouquets.

***Glyceria fluitans* R. Br.** Floating Manna-grass; Common Manna-grass. (Fig. 46.)

This grass grows to the height of from 3 to 5 feet, and has a narrow panicle composed of rather few long and narrow or cylindrical spikelets. It is a cosmopolitan species, found in all temperate regions of the world, and is regarded as one of the best fodder grasses for swampy meadows. In some parts of Europe the seeds are gathered and used for human food in the form of soups and gruels.

FIG. 45.—Rattlesnake-grass. (*Glyceria canadensis*.)FIG. 46.—Manna-grass. (*Glyceria fluitans*.)***Glyceria maritima* Wahl.** Sea Spear-grass; Creeping Sea Spear-grass; Creeping Sea Meadow-grass; Goose-grass.

A slender grass, 12 to 18 inches high, with creeping rhizomes. It occurs in the marshes along the seacoasts of New England and the Middle States, and forms a valuable element of the hay of tide-water marshes.

***Glyceria nervata* Trin.** Fowl Meadow-grass; Meadow Spear-grass; Nerved Manna-grass. (Fig. 47.)

A leafy perennial, 1 to 3 feet high, with expanded nodding panicles of small spikelets. This is a common species in low meadows and moist grounds, extending from New England southward to the Gulf States, and westward to the Pacific Coast. It is a good fodder plant for moist meadows. Varies greatly in size, according to soil and location.

Glyceria pallida Trin. Pale Manna-grass.

A slender semiaquatic, with stems 1 to 3 feet long. Found in very wet places along the margins of ponds and slow streams, ranging southward from Canada to Tennessee. Rarely sufficiently abundant to form any considerable element in the native forage.

Gymnopogon brevifolius Trin. Short-leaved Beard-grass.

A slender, wiry grass, growing in dry, sandy soils along thickets and in open pine woods from Delaware southward to Florida. It is a grass of no agricultural value.

Gymnopogon racemosus Beauv. Naked Beard-grass.

Similar to the last, but of stouter growth and with broader leaves. Found in similar situations but more common, extending from New Jersey southward and westward to the Mississippi.



FIG. 47.—Fowl Meadow-grass.
(*Glyceria nervata*.)

Gymnothrix caudata. (See *Pennisetum macrourum*.)

Gymnothrix latifolia. (See *Pennisetum latifolium*.)

Gynerium argenteum Nees. Pampas-grass.

A stout perennial, 8 to 12 feet high, with mostly radical, narrow leaves 3 to 6 feet long, and showy, silvery white or rose-red panicles 15 to 30 inches long. A much-prized ornamental for lawn decoration. The handsome panicles are used for dry bouquets. Growing Pampas plumes is an important industry in some parts of California. These plumes or panicles are cut when exposed only a few inches from the leaf sheath, then dried, and done up into bundles for shipment. Pampas-grass is a native of southern Brazil and Argentina, and there the long leaves are used for paper making, and a decoction of the rhizome is used as a diuretic. *G. roseum* is a horticultural variety, with pale, rose-colored plumes. *G. variegatum* is a form with variegated leaves.

Hemarthria compressa. (See *Rotthellia compressa*.)

Heteropogon contortus. (See *Andropogon contortus*.)

Hierochloë borealis. (See *Hierochloë odorata*.)

Hierochloë odorata Wahl. Vanilla-grass; Seneca-grass; Holy-grass; Sweet-grass. (Fig. 48.)

A rather slender, sweet-scented perennial, 1 to 2 feet high, with short culm leaves and brownish panicles. Moist meadows and mountains of the Northeastern States, extending westward to Oregon. This grass, remarkable for its fragrance, has long, creeping rhizomes, from which spring the flowering culms and numerous long-leaved sterile or flowerless shoots. These long leaves are woven into small mats and boxes by the Indians, and find a ready market because of the sweet odor, which they retain for a long time. This odor resembles that of sweet vernal grass, but is more powerful, especially when dry. In some European countries it is believed to have a tendency to induce sleep, and bunches of it are hung over beds for this purpose. It makes a good turf, but is useless for forage.

Hilaria cenchroides H. B. K. Running Mesquit; Creeping Mesquit.

A delicate, perennial grass with slender, creeping stems, the upright, leafy shoots a

few inches to nearly a foot high. This is one of the most valuable of the grasses of the dry plains and mesas of the Southwest. It forms a dense, green sward, and in habit of growth closely resembles the true Buffalo-grass. It may be propagated by the runners as well as by seed. In some parts of Mexico a decoction of the grass is a popular remedy for purifying blood, especially in cases of skin diseases.

***Hilaria jamesii* Benth.** Black Bunch-grass; "Guyetta;" Gietta.

This is a rather coarse perennial, with creeping rootstocks, and stems 12 to 18 inches high. It is common on the dry mesas of New Mexico and Arizona, extending eastward into Texas and Indian Territory. Where abundant it is regarded as one of the most valuable native grasses and furnishes excellent pasturage at all times when not covered with snow, and is frequently cut for hay. The closely

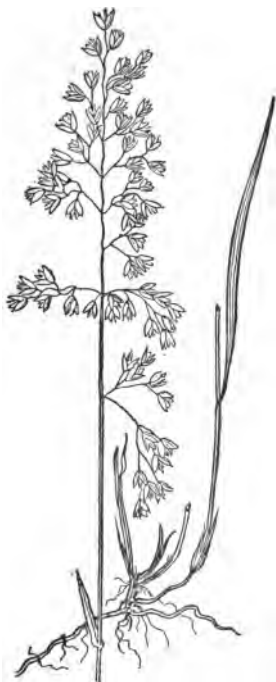


FIG. 48.—Sweet-grass. (*Hierochloa odorata*.)



FIG. 49.—Gietta-grass. (*Hilaria rigida*.)

allied *Hilaria mutica* grows in Arizona, forming dense patches of greater or less extent on hillsides, mesas, and plains. It is called "Black grama," and is largely gathered for hay, being uprooted with a hoe. (Pringle.)

***Hilaria rigida* Scribn.** Guyetta, or Gietta grass. (Fig. 49.)

In the driest regions of southern California and Arizona, growing in the deserts where other grasses are rarely if ever seen. This grass is known to the natives as "guyetta" or "gietta" grass. It has coarse, much-branched, and woody stems, 2 feet high or more, growing in great clumps, resembling in its habit some of the dwarf bamboos. The stems and leaf sheaths are clothed with a dense, white-matted pubescence, which gives to the grass a peculiarly striking appearance. In the regions where it grows it is regarded as valuable forage for pack animals and mules, there being little other vegetation which they can

eat. Without this grass miners and prospectors would find great difficulty in traversing the arid mountain and desert regions of the Southwest, since scarcely any other forage plants occur in the districts occupied by "the gietta." (Orcutt.) The *Hilarias*, of which we have four species, are grasses peculiarly adapted for growth in the drier and nonirrigable lands of the Southwest, and although they are, with the exception of *Hilaria cenchroides*, wiry and tough, the forage they afford is very acceptable in the absence of more succulent plants.

***Holcus lanatus* Linn.** Velvet-grass; Velvet Meadow Soft-grass; Velvet Mesquit; Velvet Lawn-grass; Meadow Soft-grass; Woolly Soft-grass; White Timothy; Yorkshire White; Yorkshire Fog; Salem-grass; Feather-grass; Calf-kill; Hungarian Blue-grass. (Fig. 50.)

A perennial, 1 to 2 feet high, with a creeping rootstock, clothed all over with a soft, whitish pubescence. This grass has been introduced into this country from Europe, and has become naturalized in many places. It possesses little nutritive value, and is not well liked by stock, particularly horses. It possesses some value, however, on peaty or sandy soils where the better grasses will not grow. Its cultivation, however, is not recommended. It is entirely unsuited for lawns.

***Holcus mollis* Linn.** Creeping Soft-grass.

Closely allied to Velvet-grass, and said to be similarly well adapted to light, sandy, forest lands. It is occasionally found in the Eastern States, the seed having been introduced with that of other grasses from Europe, as both *Holcus mollis* and *Holcus lanatus* are often used to adulterate the seeds of more expensive grasses, especially the so-called prepared mixtures of seedsmen. In Germany this grass is used on railway embankments, where on the poor, thin soil its strong, creeping roots form a turf which holds the earth together, thus preventing it from being washed or blown away.

***Homalocenchrus* sp.** (See *Leersia*.)

***Hordeum decorticatum*.** (See *Hordeum sativum*.)

***Hordeum jubatum* Linn.** Squirrel-tail-grass; Foxtail; Wild Barley. (Fig. 51.)

A rather slender annual or biennial, usually about a foot high, growing along the sandy seashore, borders of the Great Lakes, and in the alkaline regions of the West. The long and slender awns of the glumes are widely spreading, and the head or spike is thus given the appearance of the "brush" of the fox, hence the common name, "foxtail." This grass is sometimes recommended for cultivation for ornament, and if the tops are cut off before the awns have expanded they may be used for dry bouquets; but the heads soon break up, and for this reason the grass is of little value even for ornament. It has no agricultural value, and, in fact, where it has spread in the West, as it often does along the irrigating ditches, it becomes a serious pest. Hay containing this squirrel-grass is considered nearly valueless. The sharp-pointed joints of the spike, each with several long and slender beards, stick fast in the nose and mouth of horses and cattle, often penetrating the flesh, and cases are reported where they have caused the death of these animals.

***Hordeum murinum* Linn.** Squirrel-grass; Foxtail; Barley-grass (in California).

A coarse, tufted annual, 6 inches to 2 feet high, with dense and somewhat flattened, bearded spikes 2 to 4 inches long. The beards or barbed awns are 1 to 1½ inches long and rather rigid. This grass is a native of Europe, and has been introduced along the Pacific Coast, particularly in California, where it has become a serious pest. At maturity, the head or spike readily breaks up, and the groups of spikelets, which are sharp pointed at the base, adhere to almost any passing object; they work up the nostrils of cattle and into the fleece of

sheep, and may do injury to the animals in much the same way as the native *Hordeum jubatum*.

Hordeum pratense Huds. Wild Barley; Squirrel-tail-grass.

A slender grass, 1 to 2 feet high, with short, flat leaves and a narrow terminal spike 1 to 3 inches long, of short-bearded spikelets. This grass is widely scattered throughout the Central and Western States, growing in thin soils. It is apparently an annual, and is of little or no agricultural value.

Hordeum pusillum Nutt. Barley-grass.

This grass is similar to *Hordeum pratense*, but is usually not so tall, and the outer glumes are lanceolate instead of being bristleform, as in that species. It is of no agricultural value.



FIG. 50.—Velvet-grass. (*Holcus lanatus*.)

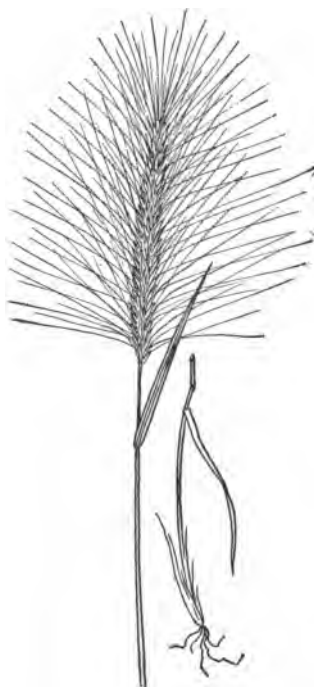


FIG. 51.—Squirrel-tail-grass. (*Hordeum jubatum*.)

Hordeum sativum Jessen. Barley.

Cultivated barley presents many varieties, primarily divided into two-rowed, four-rowed, and six-rowed races. The varieties under these races are based upon the varied characters presented by the head, beards or grain. All appear to have originated from *Hordeum spontaneum* Koch, which grows wild in the countries of southwestern Asia. Six-rowed barley has been in cultivation since prehistoric times in southern Europe; two-rowed barley is now largely cultivated in England and central Europe. The four-rowed barleys are of later origin than the others, and are most generally cultivated in northern Europe and in this country. The barley crop of the United States for 1895 was 87,072,744 bushels, of which amount six States produced over 73,000,000 bushels, California leading with 19,023,678 bushels. Barley is the most important cereal of the far north, some of the varieties being cultivated in Norway to latitude 70°. It is employed in

making bread also in northern Asia and Japan. Barley soup is an article of diet in central Europe. From naked barley (*Hordeum decorticatum*) a mucilaginous tea is prepared, used in medicine. The grain is largely fed to horses, both in this country and in Europe, but the chief use is for brewing beer. "Brewers' grain," a by-product, both wet and dry, is fed to cattle, chiefly in the vicinity of breweries.

Hydrochloa carolinensis Beauv. Floating-grass.

A slender aquatic grass of the Gulf States, growing along muddy banks and in shallow streams. The stems are often 2 feet or more in length, and in shallow water their summits appear above the surface, while in water of greater depth the uppermost leaves are floating. The tender stems and leaves are eaten by stock, and may afford some food for waterfowl.

Hygorhiza aristata Nees.

An East Indian aquatic grass, either floating on the surface of the water or creeping on wet ground. It has short and broad leaves and umbel-like panicles. Cattle are fond of this grass, and the poorer natives collect the grain by sweeping over the plants with baskets and use it for food.

Imperata arundinacea Cyrill. Blady-grass.

A sand and soil binder common throughout the warmer temperate and tropical regions of both hemispheres. It is a stout, erect, leafy grass, 1 to 3 feet high, with silvery-white spike-like panicles. The rootstocks form a perfect network of strong fibers, and in warm countries the grass is recommended for binding river banks, the sides of dams, and the loose sands of the coast. This grass is easily propagated by root cuttings, and might be utilized along the Gulf Coast, or along the Lower Mississippi in strengthening the levees. In the Malay Archipelago this *Imperata* is the principal grass of the Alang Alang fields, and is used by the natives for thatching roofs. Cattle eat it with apparent relish when young, and in Bengal it forms a very large portion of the pasturage. The Telingas make use of it in their marriage ceremonies. In western Texas and Arizona there is a native species of *Imperata* very much like the one above described in appearance and habit of growth. It grows naturally around the borders of alkaline springs.

Isachne australis R. Br. Swamp Millet.

A slender grass, creeping at the base, the upright stems 1 to 2 feet high, with loose, open panicles of very small spikelets. It is a native of southern Asia and Australia, generally found growing along the sides of streams and on swampy ground. It is said to be liked by cattle, and Mr. Fred Turner recommends it for planting on the banks of rivers or dams to protect them from injury by heavy rains or floods. The underground stems and roots quickly form a perfect mat in the soil, and when once established they make a very firm turf. The grass may be propagated by seeds or pieces of the root.

Ischæmum angustifolium Hack. Bhabur-grass.

An East Indian grass, 1 to 2 feet high, with rather hard stems and narrow, rigid leaves. It yields excellent material for cordage and is used in the manufacture of paper.

Ischæmum rugosum Gærtn.

A grass of India, common on wet ground on the plains. When young it is eaten by horses and cattle, and in some parts of the central provinces the grain is used for food. (Duthie.)

Koeleria cristata Pers. Wild June-grass; June-grass; Prairie-grass; Western June-grass.

This is a common grass upon the open meadows and plains of the Central and Western States, and extends beyond the Rocky Mountains to the Pacific Coast.

It is one of the "bunch-grasses" of the plains region, where it is generally associated with the more common Bunch-grass, *Poa tenuifolia*. On the dry benchlands it is seldom over a foot high, but in irrigated ground grows to the height of 2 feet or more, and makes excellent hay. Its cultivation, however, is not to be recommended where better grasses may be had.

Lagurus ovatus Linn. Hare's Tail.

An erect, tufted annual, from a few inches to a foot high, with soft, hairy leaves, and dense, feathery, ovoid heads, $1\frac{1}{2}$ inches long. It is a native of Europe, growing in sandy pastures and waste places. Cultivated occasionally as an ornamental grass, the heads being used in dry bouquets. Of no agricultural value.

Lamarckia aurea Moench. Golden-top; Lamarckia.

A low annual, 3 to 12 inches high, with flat leaves and elegant one-sided panicles 2 to 3 inches long. This very attractive and favorite ornamental grass is a native of southern Europe and southwestern Asia. It is frequently cultivated in gardens, and is a pleasing grass for edgings. It has escaped from cultivation in southern California, and has become apparently spontaneous there.

Leersia lenticularis Michx. Catchfly-grass; Flycatch-grass.

A rare, rather coarse, branching perennial, 2 to 4 feet high, found in wet places in the Central and South Atlantic States. It is of little, if any, agricultural value.

Leersia oryzoides Swz. Rice Cut-grass; Rice-grass; Cut-grass; False Rice; White-grass; European Cut-grass; Prickle-grass.

A rough and usually much-branched native perennial, 3 to 4 feet high, with flat leaves, whose margins are armed with minute sharp spines, and one who may carelessly draw his hand along the leaf-blade is very likely to have it severely cut, hence the common name "cut-grass" applied to this species. This grass is widely distributed throughout the temperate regions of the northern hemisphere, growing along sluggish streams and the borders of moist thickets. It possesses no recognized agricultural value.

Leersia virginica Willd. Virginia Cut-grass; White-grass; Small-flowered White-grass. (Fig. 52.)

A slender and usually much-branched leafy grass, 2 to 4 feet long. It is found in similar situations with the last, ranging from Maine to Minnesota, and southward to the Gulf. This grass is less harsh and rough than the other species of the genus here mentioned, and in low, wet meadows it sometimes forms a considerable element in the natural hay which such places produce, but like the other species of the genus it is not recognized as possessing any marked agricultural value.

Leptochloa mucronata Kunth. Feather-grass.

An annual weed common in rich cultivated grounds and gardens in the Southern States, extending northward to Illinois and Missouri. It grows to the height

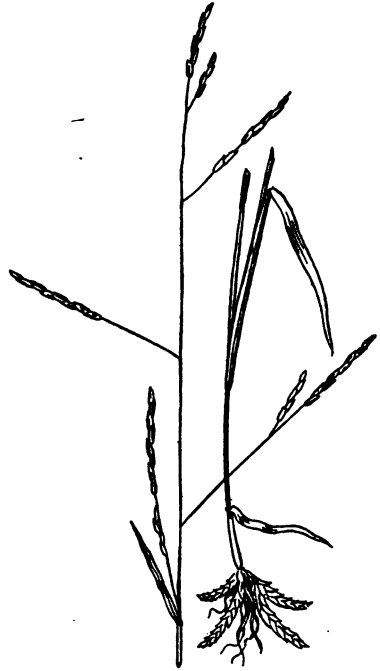


FIG. 52.—Virginia Cut-grass. (*Leersia virginica*.)

of 2 to 4 feet, has rather broad leaves and long terminal, somewhat plume- or feather-like panicles.

Lepturus paniculatus. (See *Schedonnardus texanus*.)

Lolium italicum A. Br. Italian Rye-grass.

A well-known and excellent grass for rich and rather moist lands, particularly for the Eastern States. It is a very rapid grower, forms a dense turf, and in Europe, whence the grass was introduced into this country, it is regarded as one of the best hay grasses. On stiff, heavy clays or on very dry soil it does not do well; but on good, calcareous loams or marls or on moist, loamy sands, where the soil is in good condition, it is very productive and no other grass repays manuring so well. It is not recommended for permanent pastures, as its duration is only two or three years, but it is a most excellent species for temporary meadows. Few grasses develop more rapidly than this, and where the soil is rich and its fertility maintained by applications of liquid manure, cuttings may be obtained within three or four weeks from seeding, and at intervals of a month or six weeks successive crops may be harvested. Owing to its succulent character and rapid growth, this makes one of the best grasses for soiling. Italian Rye-grass is at once distinguished from any of the forms of perennial Rye-grass by its awned or bearded spikelets. Adulterations of the seed of Italian Rye-grass are rare, owing to its relative cheapness. The average purity of commercial seed is 95 per cent, while the germinative power is 70 per cent. The germinative power diminishes rapidly with the age of the seed. One pound of seed contains on an average 285,000 grains, and the weight per bushel varies, according to the quality, from 16 to 24 pounds. Three bushels of seed of average quality are required for seeding an acre of land. Current price in the New York market is \$10 per 100 pounds.

Lolium perenne Linn. Perennial Rye-grass; Ray- or Rye-grass; Darnel; English Rye-grass. (Fig. 53.)

Perennial Rye-grass has been cultivated in England for more than 200 years, and is therefore one of the oldest if not the very first grass gathered and cultivated separately for agricultural purposes. It is indigenous to Europe, North Africa, and western Asia, and was many years ago introduced into this country from England. Here it has never been so highly esteemed as in England, where the soil and climate appear to be especially well adapted to its growth. Moist and rich loams or clays are the soils best suited to it, and, as with Italian Rye-grass, it responds promptly to the application of quick manures. For pastures on heavy soils in moist climates it is especially valuable, and under such conditions is largely used in mixtures for permanent pastures. It is a good hay grass where the conditions are favorable, but in this country will never be so highly esteemed as Timothy. There are several varieties of perennial Rye-grass recognized by agriculturists. Pacey's Perennial, a vigorous form, is one of these. The average purity of perennial Rye-grass seed is given at 95 per cent, and the germinative power at 75 per cent. Good commercial seed should grade higher than this. One pound of pure seed contains on an average 336,800 grains. Of course, where the seeds are larger and heavier, this number would be considerably less. The best seed weighs from 25 to 35 pounds per bushel, and 2 to 3 bushels of seed are required per acre. The current retail price of good seed is \$9 per 100 pounds.

Lolium temulentum Linn. Darnel; Poison Rye-grass; Bearded Darnel. (Fig. 54.)

An annual grass, 2 to 3 feet high, having a general resemblance to Italian Rye-grass, but usually stouter, more strictly erect, with longer glumes and larger seeds. It has been introduced into this country with the seeds of other grasses, and is occasionally met with in grain fields and about dwellings. The grain contains a narcotic or poisonous principle, which causes eruptions, trembling, and vertigo

in man and flesh-eating animals. If the seeds are malted with barley, the ale causes intoxication very suddenly. It is contended by some that perfectly healthy Darnel seeds are innocuous—that only grains which are ergotized or otherwise diseased are injurious.

Lygeum spartum Linn. Sennoc; Albardine; Esparto-grass (in part).

A rigid, upright grass, with creeping rhizomes and stiff, rush-like leaves. It is common on the high, rocky plains of southern Spain and Algeria, and, with *Stipa tenacissima*, furnishes the esparto of commerce, used in paper making, etc.

Manisuris granularis Swz. Lizard-tail-grass.

A much-branched annual grass, 1 to 4 feet high, with flat leaves and numerous slender spikes in irregular, leafy panicles. A weed in all tropical countries, extending into the warmer parts of the Southwestern States.



FIG. 53.—Perennial Rye-grass.
(*Lolium perenne*.)



FIG. 54.—Darnel. (*Lolium temulentum*.)

Melinis glutinosa. (See *Melinis minutiflora*.)

Melinis minutiflora Beauv. Molasses-grass, or Fat-grass.

A sweet and highly nutritious species, and the most esteemed of the grasses of central Brazil, where it is native, growing upon the hills and dry lands. It is regarded a most excellent grass for dairy cows, and deserves a trial in the Southern and Southwestern States and California. The Brazilian names for this grass are "*Capim mellado*" and "*Capim gordura*." The English names given above are translations of these. This species occurs also in Ascension, Natal, and Madagascar.

Milium effusum Linn. Wild Millet; Millet-grass; White-topped Millet-grass.

A pale-green perennial grass, 2 to 5 feet high, with broad, flat leaves and spreading panicles. This is a native of cold, damp woods and mountain meadows of the

northern portions of the United States and ranges around the world in the cooler temperate regions of the North. It is a tender grass, readily eaten by cattle, and doubtless possesses some agricultural value. The seeds are easily gathered and the propagation of the grass in wooded pastures or parks might be advantageous.

Milium multiflorum. (See *Oryzopsis multiflora*.)

Miscanthus fuscus Anders.

A rather handsome grass of the plains of northern India, 4 to 8 feet high. "It is chiefly used for thatching material, and writing pens are said to be made from its stems." (Duthie.)

Miscanthus sinensis Anders.

A handsome, showy grass, 3 to 6 feet high, used for the adornment of lawns, etc. It has long been known to florists under the name of *Eulalia japonica*. The long and very numerous lower leaves are usually marked with transverse or longitudinal white bands. The rather delicate and somewhat fan-shaped panicles, if cut when just expanding, are valued for dry bouquets.

Monanthochloë littoralis Engelm. Salt Cedar.

A creeping grass, with hard, almost woody stems, and crowded subulate leaves less than an inch long. A spray of this grass bears a striking resemblance to a branch of cedar, whence the common name. It grows on the salt marshes and in the sands along the coast from southern Florida to Texas, southern and Lower California. From its habit of growth it may possess some value as a soil and sand binder. It is too hard and rigid to be of any value for forage.

Muhlenbergia capillaris Kth. Seaside Hair-grass; Muhlenberg's Hair-grass.

An upright grass with unbranched stems, about 2 feet high, very long and rather rigid leaves, and diffusely branched capillary panicles. This grass grows in tufts or bunches in dry, sandy soil, open pine woods, etc., throughout the Southern States. It is of no agricultural value, but the delicacy of the panicles, which are often purplish-tinged, make it an attractive object for bouquets.

Muhlenbergia diffusa Schreb. Nimble Will; Wire-grass; Drop-seed-grass. (Fig. 55.)

A low, slender, diffusely branched grass growing on dry hills, in woods, and especially in shady waste grounds about dwellings. The leafy, wiry stems, which are from 6 to 18 inches long, spring from extensively creeping and rather tough rhizomes, which make a turf very difficult to break up. When young, this grass is readily eaten by all kinds of stock, but after it matures it is so tough that few animals will touch it. It possesses really very little agricultural value, and some look upon it rather as a weed. It is native from southern New England to Iowa, Michigan, and southward, blooming in the latter part of summer.

Muhlenbergia distichophylla Kth. Saccatone; Grama.

This is a strong, firmly rooted grass, 3 to 4 feet high, with rather long and rigid leaves, and a narrow panicle often exceeding a foot in length. It is frequent in the rich valleys in Arizona and New Mexico, and on rich bottom lands it is often cut for hay. It is a coarse grass, like *Sporobolus wrightii*, and by the settlers is classed with it under the general name of Saccatone. In Arizona it forms the more common "hay" that one finds in the towns and way stations, being pulled by the Mexicans or Indians and brought in on the backs of donkeys or on carts. There are many species of *Muhlenbergia* in the southwestern part of the United States and northern Mexico, and doubtless many of them are of considerable agricultural value. *Muhlenbergia virescens* is a soft and leafy species growing in clumps on the higher slopes of the mountains in Arizona, and with *Poa fendleriana* forms the chief herbage of the so-called "deer parks" of the mountains. (Pringle.)

Muhlenbergia glomerata Trin. Muhlenberg's-grass; Satin-grass; Wild Timothy.
(Fig. 56.)

An upright, usually sparingly branched perennial, 2 to 3 feet high, with densely flowered, narrow panicles 2 to 4 inches long, often resembling those of timothy; the rootstocks are very tough, and closely covered with thickened scales. It frequents bogs and low grounds from New England westward to the Rocky Mountains, extending southward to Tennessee, New Mexico, and Texas. It is little prized in the East, but in the North western States it is recommended as an excellent grass for forage.

Muhlenbergia mexicana Trin. Drop-seed-grass; Wood-grass; Knot-root-grass.
(Fig. 57.)

A much-branched, leafy perennial, 2 to 3 feet high, with strong, scaly, creeping rootstocks, which often do good service in binding river embankments, along which this grass frequently grows. In the Northeastern States this grass is common in



FIG. 55.—Nimble Will.
(*Muhlenbergia diffusa*.)



FIG. 56.—Wild Timothy.
(*Muhlenbergia glomerata*.)



FIG. 57.—Mexican Drop-seed-grass. (*Muhlenbergia mexicana*.)

low meadows, where it occasionally forms a considerable proportion of the native hay of such places. If cut before the stems have become woody, which they do after flowering, the hay produced is of good quality. It ranges from New England southward to the Gulf and westward to the Rocky Mountains. In the Eastern States it blooms in August.

Muhlenbergia pungens Thurb. Black Grama; Grama China.

A rather rigid perennial, 12 to 18 inches high, with firm, sharp-pointed leaves and open panicles. It has strong, creeping roots, and often does good service as a sand binder. In the sand-hills region of Nebraska it grows abundantly around

the borders of the so-called "blow-outs," preventing their extension and assisting materially in restoring the turf. In some parts of Arizona where it occurs it is esteemed a valuable forage plant. It grows from Nebraska southward to New Mexico and Arizona, and along the Colorado River above Fort Yuma.

Muhlenbergia texana Thurb. Grama.

This grass is a native of New Mexico and Arizona, growing on the dry mesas and table-lands. It has a straggling habit of growth. The stems are 1 to 2 feet long, much-branched, and often matted together. It furnishes excellent feed for cattle in the regions where it grows, and yields good hay, which is harvested in considerable abundance by the ranchmen. It withstands drought very well, but it is soon run out under the continued tramping of cattle.

Muhlenbergia trichopodes Chapm. Bunch Hair-grass.

A grass of the Southern States, growing in dry pine woods; similar in habit to *Muhlenbergia capillaris*. Of little value.

Munroa squarrosa Torr. False Buffalo-grass; White Alfillaria.

A low, diffusely spreading, much-branched annual, with numerous and crowded short, rigid leaves. When young the whole plant has a silvery-gray, "fuzzy" appearance, and when older it resembles alfillaria to some extent. It occurs in dry, sandy soil along roadsides and waste places, where little or nothing else grows. It spreads out over the ground, rooting at the joints, and a single plant will frequently cover a circular area of a foot or two in diameter. It is a native of Montana, extending eastward to Nebraska and southward to Texas and Arizona.

Opizia stolonifera Presl. Mexican Lawn-grass.

An extensively creeping, dioecious grass, the very slender, prostrate stems sending up leafy tufts 1 to 4 inches high. Similar in habit to Bermuda, but more delicate. According to Dr. E. Palmer, this is one of the most important grasses of Mexico. Growing close to the ground, it forms a thick sod over all exposed surfaces, even over the cobblestones in the streets of towns. It is used in the public squares with good effect. By regular watering it is kept nicely green, and but little cutting is necessary. The seed is difficult to obtain, owing to the constant nibbling of domestic animals. Propagation by cuttings of the rooting, prostrate stems is probably the best method. Trials with this grass ought to be undertaken in the Southern States, both for lawns and pastures.

Oplismenus setarius R. & S. Creeping Beard-grass.

A slender perennial of the Gulf States, with decumbent or creeping stems, and short and rather broad leaves. It possesses no recognized agricultural value, but as it grows naturally under the dense shade of trees it might be used for covering the ground in shady places where other grasses will not thrive. It can be propagated by pieces of the stem which root at the joints, and if cared for, will in a short time make a good turf. A closely allied grass of similar habit of growth, with variegated leaves, is often grown in greenhouses for its ornamental appearance.

Oryza sativa Linn. Rice.

A tropical or subtropical, semiaquatic grass, the grain of which is the staple food of one-third of the human race. It is most extensively cultivated in southern Asia, China, and Japan, and the annual produce of these countries is estimated at 100,000,000 tons. The rice-growing districts of China support the densest population in the world. In this country rice is cultivated in the States of South Carolina, Georgia, and Louisiana. The estimate of the crop of cleaned rice produced by the latter State in 1895 was 82,436,832 pounds. "Paddy" is the grain

in the husk. There are many varieties of rice, distinguished by color or size of the grain, absence or presence of awns, etc., and then there are two classes known as "lowland rice" and "upland rice." The latter is cultivated to some extent in western Tennessee. Rice straw is used for making paper.

Oryzopsis asperifolia Michx. Mountain Rice; Large White-grained Mountain Rice.

A perennial, 6 to 18 inches high, with very long basal leaves overtopping the stems. This grows in rich, open woods, upon hillsides, from New England to Minnesota and northward. It is one of the early blooming species, flowering in May and ripening its seed in June and July. The leaves remain green throughout the winter.

Oryzopsis canadensis Torr. Small Mountain Rice.

A slender perennial, 6 to 15 inches high, with almost thread-like basal leaves, and a narrow few-flowered panicle. It is a native of the Northern States, from Maine to the mountains of Pennsylvania and westward to Minnesota, growing upon rocky hills and in open woods, blooming in May. It is never sufficiently abundant to form any material part of the natural herbage.

Oryzopsis cuspidata. (See *Oryzopsis membranacea*.)

Oryzopsis melanocarpa Muhl. Black-fruited Mountain Rice.

A rather stout, long and broad-leaved grass, 2 to 3 feet high, with a simple panicle of a few rather large spikelets. Grows in rich, rocky woods from New England southward to Pennsylvania and westward to the Rocky Mountains, blooming in July and August. These species of *Oryzopsis* have no recognized agricultural value, but they are very hardy perennials and might be propagated to advantage in woodland parks.

Oryzopsis membranacea Vasey. Indian Millet; Quivering-grass; Bunch-grass; Wild Millet; Sand-grass. (Fig. 58.)

A grass of rather striking appearance, 1 to 2 feet high, widely distributed throughout the Rocky Mountain region from British America southward to Texas and New Mexico, eastward to the Missouri, and westward to the Sierras of California. It grows in dry, sandy soils, forming bunches of greater or less size, and from this habit of growth it has been called, along with a number of other grasses, "Bunch-grass." It thrives in soil too dry and sandy for the growth of most other grasses, and is much esteemed for grazing in the regions where it abounds. In New Mexico this grass is by some deemed superior to grama, on account of its large and nutritious seeds or grains, which are used by the Indians to some extent for food.

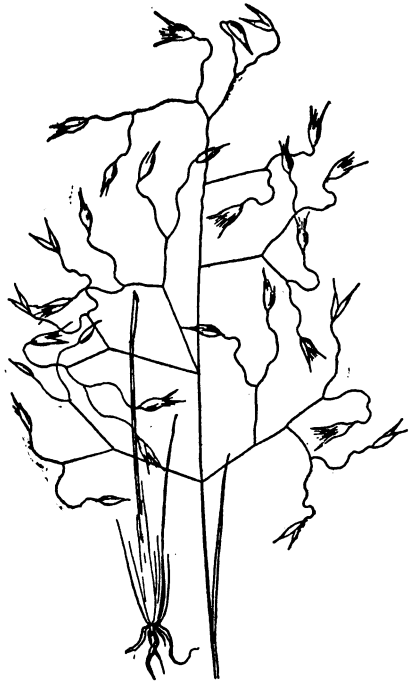


FIG. 58.—Indian Millet. (*Oryzopsis membranacea*.)

Oryzopsis multiflora Beauv. Many-flowered Millet-grass.

A perennial, 2 to 3 or 4 feet high, with a many- and small-flowered nodding panicle, 6 to 12 inches long. It is a native of central and southern Europe, growing in dry, open woods and thickets. Was introduced into California in 1879, and has been cultivated experimentally with varying success at a number of points in that State. On the granitic soil of San Diego, Cal., it has grown 3 feet high without irrigation, and remained green throughout the year. Horses and cattle are said to eat it greedily. In Europe it is not regarded as possessing much, if any, agricultural value.

Panicum agrostoides Muhl. Panic Bent-grass; Munro-grass; Red-top Panic-grass.

A native perennial, with branching, leafy stems 2 to 4 feet high, and a panicle resembling that of Red-top. It grows in low meadows and along the banks of creeks, shores of ponds, etc., and often yields a large amount of very good native hay. In low, moist, and rather rich meadows its cultivation would doubtless be profitable, and it is certainly deserving of a trial in such locations.



FIG. 59.—Munro-grass. (*Panicum agrostoides*.)



FIG. 60.—Bitter Panic-grass. (*Panicum amarum*.)

Panicum amarum Ell. Bitter Panic-grass. (Fig. 60.)

A grass of the sandy seacoasts, ranging from Connecticut southward to Florida and along the Gulf. It has coarse, hard stems, 1 to 5 feet high, and strong, creeping rootstocks, making it an excellent sand binder. The islands off the coast of Mississippi are almost wholly made up of drift sands, the outer sides being dunes from 10 to 30 feet high, while the middle of the islands is usually low and occupied by swamps or lakes. This bitter panic is very abundant upon the outside of these dunes, where it is exposed to the winds and waves, and where it serves to effectually bind the otherwise shifting sands. The leaves and stems have a bitter taste, hence the common name.

***Panicum antidotale* Retz.**

A tall, coarse, glabrous perennial of northern India, with long, narrow leaves and contracted panicles, in general appearance resembling Guinea-grass. Common all over the plains, in hedges and among bushes. Of doubtful value as a fodder plant, being grazed only when quite young. Regarded as injurious to stock when eaten green. The smoke of this grass has a reputed value for fumigating wounds and as a disinfectant in smallpox. In Madras, India, it is used medicinally in throat affections. (Duthie.)

Panicum barbinode.* (See *Panicum molle.*)**Panicum capillare* Linn. Old Witch-grass; Fool-hay.**

An annual, with usually coarse, branching stems, 1 to 3 feet long, hairy leaf sheaths, and widely spreading panicles. Grows in cultivated grounds, where it often becomes a somewhat troublesome weed. Being an annual, however, it is easily eradicated. Possesses no value for fodder.

***Panicum ciliatissimum* Buckl. Indian Wheat.**

A more or less extensively creeping perennial, with short leaves and upright flowering stems, 6 to 18 inches high. The panicles are narrow and few-flowered, and in the prostrate forms usually partly included within the leaf sheaths. This grass is a native of western Texas and doubtless possesses some agricultural value for the drier regions of the Southwest. The creeping stems resemble somewhat those of Bermuda-grass, but the leaves are usually more crowded and broader in proportion to their length.

***Panicum colonum* Linn. Shama Millet; Wild or Jungle Rice.**

A native of the tropical and warmer temperate regions of the Old World. In northern India it is considered one of the best fodder grasses. Introduced into the Southern and Southwestern States, where it is occasionally found in waste grounds about dwellings. It is closely related to *Panicum crus-galli*, differing from that grass in its smaller size and more simple inflorescence. The stems and leaves are tender and readily eaten by stock, and in India the grain, which is produced abundantly, is sold in the markets and used for food.

***Panicum crus-galli* Linn. Barn-grass; Barnyard-grass; Barnyard-millet; Cock's-foot; Water-grass; Large Crowfoot-grass; An-kee (American Indian). (Fig. 61.)**

This well-known annual of rank growth is common in rich, cultivated ground, especially around dwellings. There are several forms presented by this species. That growing as a weed around barnyards and dwellings, in cultivated grounds in the Atlantic States, was probably introduced from Europe. There are, however, several native varieties, or possibly good species. One of these occurring in the brackish marshes or meadows along the seacoast, grows to the height of 3 to 5 feet, with the lower leaf sheaths very hirsute, and the spikelets long-awned. A tall, smooth form occurs in New Mexico, Arizona, and the Mohave desert region, springing up after the summer rains in all swampy places or lowlands. It grows to the height of 6 or 7 feet, and its seeds, which it produces abundantly, are collected by the Mohave Indians, ground into flour, and cooked for food. The poorer classes of India also use the grain for food. A variety introduced from Japan has been cultivated at some of the experiment stations and treated as a millet. At the Hatch Experiment Station, in Massachusetts, the crop produced was very uniform, averaging 7 feet in height. The yield was at the rate of 11,207 pounds of straw per acre and 66.7 bushels of seed. When sown for silage or for soiling at the rate of one peck of seed to the acre, the yield was at the rate of from 15 to 18 tons per acre. A field sown July 26, after a crop of hay was removed, yielded 12 tons per acre. It is very much liked by stock, and is a valuable forage plant for feeding green or for the silo. It is not so well adapted for hay, as it is a coarse, succulent grass, and rather difficult to dry.

Panicum curtisii Chapm. Maiden Cane; Simpson's-grass.

A rather coarse grass, 2 to 4 feet high, growing along ditches, in swamps, and in moist sands from Delaware southward to Florida and along the Gulf near the coast. It has strong and widely spreading or creeping rootstocks, which are useful in binding sandy railroad embankments in the Southern and Gulf States.

Panicum decompositum R. Br.

A stout, semiaquatic, Australian grass, with long, flat leaves, and diffusely branching panicle 6 to 12 inches long. The grain is used for food by the aborigines of Australia. Baron Ferd. von Mueller says of this and the Australian *Panicum effusum* that "they are among the few nutritious grasses fit for hot and arid desert tracts." The habit of *P. decompositum* closely resembles that of *Panicum proliferum* (which see).

Panicum divaricatum Linn. Branching Panic; Small Cane.

A smooth, somewhat shrubby grass, with stems 6 to 8 feet high, and numerous short, spreading branches. It is a grass of tropical and subtropical America presenting quite a variety of forms, one of these extending into southern Florida.



FIG. 61.—Barnyard-grass. (*Panicum crus-galli*.)



FIG. 62.—Guinea-grass. (*Panicum jumentorum*.)

Panicum fasciculatum Sw. Concho-grass.

A rather coarse and much-branched leafy annual, growing in clumps to the height of 2 to 3 feet. The leaves are flat, one-fourth to one-half an inch wide, and 2 to 6 inches long. It is a native of Texas and Florida. Similar in character and closely allied botanically to *Panicum texanum*.

Panicum filiforme Linn. Slender Crab-grass.

A native annual grass, common in sandy soils, particularly in old fields, flowering in July and August. It is closely related to Crab-grass, which it much resembles, but is more slender in its growth, and is of very little or no agricultural value.

***Panicum flavidum* Retz. Kangna (India).**

An annual with rigid, erect culms, 1 to 2 feet high. Common throughout the plains region of northern India, and generally considered a good fodder grass. It produces a large quantity of grain, which is collected and eaten by the poorer classes in times of scarcity.

***Panicum frumentaceum* Roxb. Shamalo or Deccan grass.**

An annual, 2 to 4 feet high, with rather broad leaves and narrow, erect panicles. Closely related to and somewhat resembling Barnyard-grass. It is of rapid growth, and is largely cultivated in northern India as a rainy-season crop. The seeds are used for food by the poorer people, while the stalks are used as fodder for cattle.

***Panicum helopus* Trin. Kuri (India).**

A grass of southern Asia, with creeping or ascending branching stems, 1 to 2 feet high. Cultivated grounds, etc., in northern India, where it is regarded an excellent fodder grass for horses and cattle. This grass resembles *P. fasciculatum* in habit.

Panicum hirtellum*. (See *Oplismenus setarius*.)**Panicum italicum*. (See *Setaria italica*.)*****Panicum jumentorum* Pers. Guinea-grass; St. Mary's-grass. (Fig. 62.)**

This grass was long ago introduced into America, presumably from tropical Africa, and has for many years been cultivated in tropical South America and the West Indies. In these regions it is spoken of as being a splendid pasture grass, growing to the height of 12 feet, forming dense tufts. It is readily propagated by cuttings of the creeping rootstocks. It has been introduced into some of the Gulf States, particularly Florida, where it is highly valued. Few grasses yield a larger amount of fodder, and it may be cut as often as once a month during the growing season. If allowed to attain its full size it becomes coarse and unfit for forage. Its stems are killed by the first frosts of autumn, and it seeds only in the warmest parts of the States bordering the Gulf. It is much less hardy than Johnson-grass, with which it has been confounded by some, and has quite a distinct habit of growth.

***Panicum junceum* Nees.**

Rigid, erect, branching grass, 3 to 5 feet high, with a rather large, more or less densely flowered, nodding panicle. This is a native of South America, and in Argentina the strong rhizomes are used as a substitute for soap in washing woolen goods.

***Panicum leucophæum* H. B. K. Cotton-grass.**

A variable species widely distributed throughout the tropical regions of both hemispheres. It is a perennial with slender or stout stems 1 to 3 feet high, usually with flat leaves and narrow panicles, the spikelets being densely clothed with long silky or cottony hairs, which are white, or sometimes brownish or purplish. When abundant this grass yields excellent pasturage. It has been found in southern Florida and at other points near the Gulf coast. There is a variety of this species growing in the dry regions of Arizona and New Mexico which has more slender stems, that spring from strong woolly and knotted rhizomes. Doubtless this form would be a valuable pasture grass for the dry or semiarid regions where it is native.

***Panicum maximum*. (See *P. jumentorum*.)**

***Panicum miliaceum* Linn. Common Millet; Millet; Manitoba Millet; Broom-corn Millet; Brown Millet; Japanese Panicle Millet; Dakota Millet; Hog Millet; Russian Millet.**

A rather coarse annual, attaining a height of 2 to 4 feet, with large, drooping,

loosely flowered panicles. There are several varieties, distinguished by the color of the fruit or character of the panicle. This is the true millet which has been cultivated in the East from prehistoric times, so that now its native country is not known. It is still cultivated to a considerable extent in China and Japan, also in South Russia and Roumania, and to a limited extent in other parts of Europe and North Africa. It requires a rich soil, and under favorable conditions its growth is very rapid and its production of seed large, in some instances amounting to 60 or 70 bushels to the acre. The grain is nutritious, and is one of the best for feeding poultry. When ground the flour makes a rich and nutritious porridge, for which purpose it is chiefly used in the eastern countries where the grass is grown. In northern India, where the grain is largely used, a preparation of it constitutes a favorite food at marriage ceremonies. Owing to its rapid and somewhat succulent growth, it is an excellent soiling plant. It has, however, been little cultivated in this country, but is occasionally found in the older settlements in cultivated fields and waste grounds about dwellings. The number of grasses termed millets in various parts of the world is large, and includes many very different species, whose grain, however, is used for human food. Most of the so-called millets belong to the genera *Setaria*, *Panicum*, and *Paspalum*. They form the principal food grains of the natives of many parts of Africa and Asia. It has been estimated that the millets feed one-third of the human race.

***Panicum miliare* Lam.**

An annual, with branching stems, 2 to 3 feet high, and drooping, loosely flowered panicle. A native of India, where it is cultivated to some extent by the poorer classes for its grain.

***Panicum molle* Sw. Para-grass; Yerba de Para; Spanish-grass.**

A rather coarse, reed-like perennial, 4 to 6 feet high, with hairy nodes, and narrow, lax panicles, 6 to 8 inches long. It is cultivated in South America and in the West Indies and Mexico, and has been introduced into some of the Gulf States. It is grown with success on the high pine ridges of Florida, and wherever cultivated it is most highly esteemed and regarded as a very fattening pasture grass. How far to the north this grass may be grown successfully does not appear to have been determined, but it is hardy at the Cape of Good Hope and other far extra tropical regions (Baron von Mueller). It is propagated either by seeds or root cuttings.

***Panicum obtusum* H. B. K. Vine Mesquit; Grapevine Mesquit; Grapevine-grass; Range-grass (Arizona).**

A stoloniferous grass, the runners attaining a length of 8 to 10 feet, the upright flowering culms 12 to 24 inches high. This grass ranges from Colorado to Texas, New Mexico, Arizona, and southward into Mexico. It is usually found in irrigated lands or in the low, damp soil of the valleys, most frequently under the shade of trees and shrubs. No attempts have been made to cultivate this grass, but its appearance and habit of growth indicate an agricultural value of sufficient importance to call for experiments in its cultivation. In New Mexico this species is called "Wire-grass."

***Panicum plicatum* Lam.**

A broad-leaved perennial, 3 to 4 feet high or more, native of India. The leaves are elegantly striate and usually plicate, giving to the grass an unusual and at the same time attractive appearance. It is a favorite ornamental for greenhouse culture.

***Panicum proliferum* Lam.** Sprouting Crab-grass; Sprouting Millet.

A smooth and usually much-branched native annual, with rather coarse, spreading or ascending stems 2 to 6 feet long, flat leaves, and diffuse terminal and lateral panicles. It grows naturally in moist, rich soil along the banks of streams and rivers, around the shores of ponds and lakes, and in the South is often abundant in rich, cultivated fields, growing with Crab-grass. The stout, succulent stems are sweetish and much liked by horses and cattle. Its range is from Maine to Iowa, and southward to the Gulf, blossoming in the latter part of summer or early autumn. A spontaneous growth of this grass in cultivated fields after the removal of crops is of some value for hay or pasturage, but its cultivation can not be recommended in view of the fact that we have many annual grasses much superior to it. In the Northern and Middle States it is classed with the weeds.

***Panicum prostratum* Lam.**

A low, creeping grass of the tropical regions of both hemispheres. It is common on the plains of northern India, where it is regarded as a good fodder plant, and in times of famine the grain is used for food.

***Panicum repens* Berg.** Creeping Panic.

An extensively creeping grass, with rather stiff upright stems, 1 to 2 feet high or less. It is common in the maritime districts in southern Asia, northern Africa, southern Europe, and Australia. It is also found along the shores of the Southern States bordering the Gulf, extending westward to Mexico. It has no agricultural value, but is a natural sand binder, and upon the sandy islands lying off the Gulf Coast it grows abundantly upon the outside of dunes, protecting them from the action of the winds and waves.

Panicum roseum. (See *Tricholæna rosea*.)

***Panicum sanguinale* Linn.** Crab-grass; Finger-grass; Hairy Finger-grass; Manna-grass; Polish Millet; Red Millet. (Fig. 63.)

A well-known annual, common in nearly all parts of the United States, growing in cultivated fields and about dwellings. It is a weed in gardens and among hoed crops. In grain fields after harvest it frequently springs up in such quantity, particularly in the Southern States, as to yield one or even two good cuttings of hay. This spontaneous growth affords excellent pasturage, as well as hay of first quality if properly cured. The stems are much branched, and in good soil attain a length of 3 to 4 feet. This grass contains little fiber, and dries quickly when cut, but if after cutting it is wet by rains or heavy dews its value for hay is almost wholly destroyed. In Bohemia, Crab-grass is cultivated upon sandy soils and the grain is used for food in the form of mush or porridge.

***Panicum serotinum* Trin.** Little Crab-grass; Creeping Crab-grass. (Fig. 64.)

A species related to Crab-grass (*Panicum sanguinale*), common in the Southern States near the Gulf, disputing with Louisiana-grass the claim of being the most valuable native pasture grass of that section. It is probably a biennial. It is much like Crab-grass, sending out leafy, creeping shoots at every joint, but is smaller in every way, with shorter and more hairy leaves of a lighter green color. It is invaluable for pasturage, forming a close turf, and driving out nearly all other plants. It grows best in sandy soil where there is a little moisture.



Fig. 63.—Crab-grass. (*Panicum sanguinale*.)

Panicum spectabile Nees. Angola-grass.

A stout grass, 3 to 5 feet high, with rather broad and long (1 to 2 feet) leaves, and a terminal densely flowered, compound, and narrow spike 8 to 10 inches long. Imported into South America many years ago from the west coast of Africa (the region of Angola). It is cultivated on the low lands in the eastern part of Brazil, particularly in the region of Rio de Janeiro, where it is called "Capim d'Angola." This *Panicum* is closely related to and resembles some forms of Barnyard-grass (*P. crus-galli*). It is spoken of as an extremely productive and nutritious fodder grass, and may prove valuable for the low regions along the Gulf Coast.

Panicum sulcatum Aubl.

A South American perennial, 4 to 6 feet high, with palm-like leaves 1 to 2 inches broad and 16 to 20 inches long, and long, terminal, narrow panicles which taper



FIG. 64.—Creeping Crab-grass.
(*Panicum serotinum*.)



FIG. 65.—Texas Millet. (*Panicum texanum*.)

above and below. The leaves of this grass are deeply sulcate or plicate, like those of the Indian *P. plicatum*. Sometimes cultivated for ornament in green-houses or upon lawns.

Panicum texanum Buckl. Texas Millet; Bottom-grass; Colorado-grass; River grass; Goose-grass; Buffalo-grass; Austin-grass; Concho-grass. (Fig. 65.)

A branching, leafy annual, 2 to 4 feet high, with a narrow panicle 6 to 8 inches long terminating the main stem and branches. It is nutritious, of rapid growth, and upon good soil yields a large amount of excellent hay, and may be cut twice or even three times during the season. It reseeds itself readily. It prefers rich, alluvial soil along river bottoms, etc., and upon such land withstands drought well. In certain parts of Texas, particularly in the counties along the Colorado River, in the central part of the State, where it appears to be native and where

it often comes up in cultivated fields after the removal of corn or other grain crops, it is spoken of in the highest terms as a hay-producing grass.

***Panicum turgidum* Forsk.**

A coarse, hard grass, 1 to 2 feet high, with short leaves and small panicles. A native of the East. In Egypt a kind of bread is made from the grain.

***Panicum virgatum* Linn. Switch-grass; Wild Red-top; Black Bent. (Fig. 66.)**

A tall, native perennial, 3 to 5 feet high, with strong, creeping rootstocks, long, flat leaves, and ample, spreading panicles. When young this affords good grazing, but at maturity the stems become hard and practically worthless for fodder. It ranges from Maine southward to the Gulf and westward to the Rocky Mountains. It is particularly common near the coast in the sandy soils bordering the marshes, and plays an important part there, oftentimes, in preventing the drifting of sands by the winds or the washing of soils by overflows and high tides. On good lands it is very productive, and if cut before the stems have become hard yields a large amount of hay of very good quality.

***Pappophorum laguroideum* Schrad.**

A handsome ornamental, 3 to 5 feet high, with narrow, plume-like panicles a foot or more long. It is a native of Mexico, and has been successfully grown from the seed on the grounds of the Department of Agriculture. It is worthy of introduction as an ornamental for gardens and lawns because of the beauty of its pale straw-colored panicles.

***Pappophorum wrightii* S. Wats. Purple-grass.**

A slender and apparently annual grass of western Texas, New Mexico, and Arizona, growing on the open plains and among the foothills of the mountains. It has short, narrow leaves and narrow, densely-flowered heads or panicles, which are softly bearded and grayish or purplish. It is said to be fully equal to Grama or Buffalo-grass in nutritive value, and more palatable to horses or mules.

***Paspalum boscianum* Flügge. Purple Paspalum.**

A rather stout perennial with ascending branching stems, 2 to 3 feet high, long, flat leaves, and numerous racemes crowded near the summit of the culm and its branches. It is a native of the Southern States, growing in moist grounds, preferring rather heavy soils. Like other species of *Paspalum*, it grows in tufts and often occurs covering considerable areas to the exclusion of other grasses. It yields a good bulk of sweet hay, but is rather slow in drying.

***Paspalum dilatatum* Poir. Hairy-flowered Paspalum; Large Water-grass.**

A rather coarse, leafy perennial, growing in clumps 2 to 5 feet high, bearing near the summit of the stems two to ten more or less spreading racemes or spikes of crowded, hairy spikelets. It is a native of Brazil and possibly was originally introduced into the Southern States (where it has become quite widely distributed) from that country, although it may be a native here. It ranges northward from the Gulf to southern Virginia and Tennessee, and westward to Texas,



FIG. 66.—Switch-grass. (*Panicum virgatum*.)

growing most abundantly on low, black soils, which are well supplied with moisture. It is considered an excellent pasture grass, and when well established endures seasons of excessive drought without injury. It is particularly valuable as furnishing excellent late summer and autumn feed, during which period it makes its principal growth.

Paspalum distichum Linn. Knot-grass; Joint-grass; Silt-grass; Seaside Millet; Water Couch (in Australia). (Fig. 67.)

A low, creeping species, resembling Bermuda-grass. It is common in the Southern States along the seacoast and in the interior, extending southward from Virginia to the Gulf, and westward to Texas, Arizona, southern California, and northward to Oregon. It occurs throughout the tropical regions of both the



FIG. 67.—Knot-grass. (*Paspalum distichum*.)



FIG. 68.—Smooth Paspalum. (*Paspalum laxum*.)

Old and New World. It grows in more or less sandy soils around the margins of ponds and along river banks, and in such places it often does good service in binding soils subject to wash, and the grass can well be recommended for this use. Its stems are somewhat succulent, extensively creeping, rooting at the nodes. The leaves are tender, affording excellent grazing. The upright stems are a few inches to a foot high, and bear at their summits two slender spikes. This character at once serves to distinguish it from Bermuda, which has several spikes at the apex of the flowering culms.

Paspalum exile Kipp. Fundi or Fundungi.

A slender annual, about 2 feet high, with usually three terminal racemes 3 to 4 inches long. Cultivated in Sierra Leone, where it is native, for its grain, which is used for food.

***Paspalum laeve* Michx.** Smooth Paspalum. (Fig. 68.)

A tufted native perennial, with ascending or erect stems, 1 to 3 feet long, flat leaves, and two to five more or less spreading spikes, 2 to 4 inches long. Common in the Middle and Southern States, growing in open fields, meadows, etc., usually where the ground is somewhat moist. It is a late summer grass, blossoming from July to October. Well liked by all kinds of stock. In cultivated grounds, and particularly on lawns, which it occasionally invades, it must be classed as a weed.

***Paspalum notatum* Flüggé.**

A perennial species, resembling *Paspalum distichum*, or Knot-grass, but of stouter growth, native of South America, and extending northward into Mexico. It forms a dense carpet-like sward on meadows, and in somewhat saline soil it becomes particularly luxuriant. This grass is employed in certain parts of tropical America as a remedy for venereal diseases.

Paspalum ovatum*.** (See *Paspalum dilatatum*.)Paspalum platycaule* Poir.** Carpet-grass; Louisiana-grass. (Fig. 69.)

A slender, erect, or more frequently prostrate and extensively creeping perennial, rooting at the nodes, and sending up numerous leafy flower-bearing branches, 6 to 24 inches high. The very slender racemes or spikes borne at or near the summit of the stems are 1 to 3 inches long. The prostrate creeping stems spread rapidly, and soon form a dense, carpet-like growth, crowding out all other vegetation. It withstands protracted drought, grows well on almost any soil, and in the more southern districts is evergreen, yielding good pasturage both summer and winter. It is regarded as one of the most valuable native pasture grasses of the regions bordering the Gulf, and is a most excellent lawn grass, superior to Bermuda and less difficult to eradicate. It is found in the warmer regions of both North and South America. It is readily propagated by sets and seeds.



FIG. 69.—('Carpet-grass. (*Paspalum platycaule*.)

***Paspalum plicatulum* Michx.** Bull-grass; Purple Paspalum.

Tufted, 2 to 3 feet high, growing in dry, sandy, open ground in the pine barrens of the Gulf States. The racemes or spikes, which are borne near the summit of the stems, are 1 to 2 inches long. Said to furnish fairly good grazing when young, but the stems soon become harsh, wiry, and unpalatable. It is of comparatively little agricultural value.

• ***Paspalum purpurascens*.** (See *Paspalum boscianum*.)***Paspalum repens* Berg.** Creeping Paspalum.

A South American perennial aquatic, with long, creeping rootstocks, and many upright, floating stems. "The sheaths are inflated and seem to act as floats. Cattle are so fond of this grass that they will wade far into the water to get a bite of it." (Morong.)

***Paspalum scrobiculatum* Linn.** Koda (India); Ditch Millet.

A smooth annual, with branching erect or ascending stems, 2 feet high or more. Widely distributed throughout the tropical and subtropical regions of both

hemispheres. In habit resembling our native *P. boscianum*. In northern India this grass is cultivated throughout the plains region as a "rainy-season crop." It is usually sown on the poorer kinds of soil, the grain being chiefly consumed by the lower classes. The straw is used for fodder. (Duthie.) A variety of *P. scrobiculatum*, called "hureek" in India, which is perhaps the Ghohana-grass, an Indian species reputed poisonous, is said to render the milk of cows that graze upon it narcotic and drastic. (Lindley.)

***Paspalum undulatum*.** (See *Paspalum plicatulum*.)

***Paspalum virgatum* Linn.**

A stout, coarse perennial, 3 to 6 feet high, with long leaves and an inflorescence of many slender spikes. A native of Mexico and South America. In Paraguay it is largely used for thatching, for which purpose it is very durable. (Morong.)

***Penicillaria spicata*.** (See *Pennisetum spicatum*.)

***Pennisetum cenchroides* Rich.** Anjan-grass; Dhaman.

A native of southwestern Asia and Africa, in which countries it is regarded as one of the best grasses for green fodder and hay. It is so nutritious that the natives have a saying, "What clarified butter (ghi) is to man the Dhaman is to a horse." This grass grows to the height of a foot or more, and has a dense head or spike 1 to 2 inches long.

***Pennisetum japonicum* Trin.**

Erect, with flattened, simple stems 1 to 2 feet high, very narrow leaves, and comparatively loosely flowered purplish or yellowish nodding panicles. A native of Japan. Occasionally cultivated as a curiosity or for ornament.

***Pennisetum latifolium* Spreng.**

A rather broad-leaved, ornamental perennial, 3 to 5 feet high, branching above, with greenish, rather dense panicles 1½ to 2 inches long. Native of Uruguay and Argentina. In the latter country it is used for covering roofs of houses. Occasionally found cultivated here as an ornamental grass. It forms large tufts and is easily propagated by the roots or seeds. It may possess some value as a forage plant.

***Pennisetum longistylum*.** (See *Pennisetum villosum*.)

***Pennisetum macrourum* Trin.**

A South American species, with unbranched stems, 3 to 4 feet high, and densely flowered, cylindrical, yellowish panicles 6 to 8 inches long. Cultivated occasionally for its odd and ornamental appearance.

***Pennisetum spicatum*.** Pearl Millet; Japan Millet; Cat-tail Millet; East India Millet; Horse Millet; Egyptian Millet; Indian Millet; African Millet; African Cane; Bajree Millet; Bulrush Millet.

An annual of luxuriant growth, 6 to 10 feet high, with long, broad leaves, stout culms, and terminal, erect, cylindrical, dense spikes 6 to 12 inches long, closely resembling those of the common cat-tail of the marshes. It is a native of the East, where it has been cultivated for its grain for many years. It is an important agricultural grass of Central Africa. It requires a rich, loose soil to obtain the best growth, and under favorable conditions produces an enormous quantity of green fodder, for which purpose it can be cut several times during the season. It does not dry out readily and is often difficult to cure into hay. It has been cultivated with success as far north as Pennsylvania and in many parts of the South for a good many years. It is best sown in drills about 2 feet apart, and 5 to 6 pounds of seed are required per acre. The weight of good seed per bushel is 56 pounds. The current price is \$12 to \$14 per 100 pounds.

Pennisetum typhoideum. (See *Pennisetum spicatum.*)

Pennisetum villosum Brown.

An Abyssinian species which has been introduced into cultivation because of its ornamental appearance. It grows to the height of 1 or 2 feet, has long, narrow leaves, and dense, oblong or cylindrical, finely bearded heads 2 to 4 inches long. It is a hardy perennial, graceful and attractive in appearance, and is very frequently cultivated as an ornamental under the name of *Pennisetum longistylum*.

Phalaris angusta. (See *Phalaris caroliniana.*)

Phalaris arundinacea Linn. Reed Canary-grass; Ribbon-grass.

A tall, leafy perennial, 2 to 4 feet high, from a creeping rootstock, with smooth sheaths and narrow, branching panicles 4 to 8 inches long. It is a native, common on low, wet grounds from New England southward to Tennessee, and extending across the continent to California and Washington. It is native also in Europe and northern Asia. It is little affected by either drought or cold, and thrives well in the shade. It succeeds best on stiff, wet land, and on wet, flooded fields, and will grow fairly well upon rather dry, sandy soil. The rootstocks are very strong and creep extensively, making this grass particularly valuable for binding embankments of rivers and ditches where the water supply is ample. It does not attain its full size until the second year, and if designed for hay should be cut before flowering, for when fully mature the stems become woody and are too hard to make good fodder. The seed, which matures in July and August, is easily gathered, and good seed should have 95 per cent purity and 60 per cent germination. It may be propagated by seed or by cuttings of the rootstocks, these being laid down at intervals of 1 foot, and slightly covered. The retail price of seed quoted in the New York market is \$35 per 100 pounds. A variety of this grass, with white-striped leaves, is cultivated in gardens for ornament.

Phalaris canariensis Linn. Canary-grass. (Fig. 70.)

An erect annual, 1 to 3 feet high, with flat leaves, and dense, ovoid panicles or heads about an inch long. This grass is apparently a native of the warmer countries of Europe, also of north Africa and western Asia. It has become widely distributed throughout the tropical regions of the world, including Australia. Cultivated in Germany and southern Europe. It has been introduced into this country and is occasionally cultivated for its seeds, which are used for bird food. The flour from the seeds is utilized in certain processes of cotton manufacture (weaver's glue), and is even employed in the making of some kinds of cake. It is frequently met with in waste grounds about dwellings in the vicinity of towns.

Phalaris caroliniana Walt. California Timothy; Southern Canary-grass; Reed Canary-grass; American Canary-grass; Stewart's Canary-grass; Gilbert's Relief-grass.

This and *Phalaris angusta* have usually been regarded as one species, the latter as a variety with more elongated heads and rather stouter growth. Both the species and variety are perennials, ranging from South Carolina to Florida and westward to Texas, Arizona, California, and northward on the Pacific Slope to Oregon. The variety *angusta* (Fig. 71) is a stout grass, 2 to 5 feet high, and is sometimes called



FIG. 70.—Canary-grass.
(*Phalaris canariensis.*)

California Timothy, owing to the resemblance of its heads to those of timothy. In California it is not esteemed as of any agricultural value, but in the Southern States it has been cultivated to a limited extent, and is spoken of by some as being an excellent grass for winter and spring grazing, as it remains green throughout the winter season.



FIG. 71.—California Timothy. (*Phalaris caroliniana*.)

Phalaris intermedia. (See *Phalaris caroliniana*.)

Phleum alpinum Linn. Mountain Timothy; Native Timothy.

This grass is a native of the mountain regions and high altitudes, extending from Maine to California northward; also in northern Europe and Asia. It is closely related to cultivated timothy. The stems are usually stouter, more leafy, but not so tall, under most favorable conditions attaining a height of 2 feet, but rarely exceeding a foot.

Phleum pratense Linn. Timothy; Herd's-grass (in New England); Cat's-tail-grass; Meadow Cat's-tail-grass; Tame Timothy. (Fig. 72.)

This is one of the best known and most extensively cultivated hay grasses. It is a native of Europe, north Africa, and northern and middle Asia, and has become thoroughly naturalized in North America. It appears to have been first cultivated in this country, and it was from this country that the seeds were obtained for its cultivation in England, about the year 1760. It has never attained the same high esteem in England that it holds here, where it is regarded as the standard of comparison for all other grasses grown for hay. It succeeds best on moist loams or clays. In very dry ground the yield is apt to be light. On such soils the base of the stem is often thickened and bulb-like. Timothy is

usually sown in mixtures with other grasses and clovers. It may be used with red or alsike clovers, or with red-top. Good fresh seed should have an average purity of 97 per cent and a germinative power of 85 to 90 per cent, a bushel weighing 48 pounds. The amount required per acre varies with the quality of the seed, but of that containing 87 per cent pure in germinating, 16 pounds to the acre is sufficient. It is better, however, to sow half a bushel to the acre if sown alone. With red or alsike clovers about 10 per cent timothy is a proper mixture.

Phragmites communis Trin. Common Reed or Reed-grass.

This is one of the largest of our native grasses, growing to the height of 12 feet, the rather stout culms bearing numerous broad, spreading, and sharply pointed leaves 1 to 2 feet long. It has deeply penetrating and extensively creeping root-stocks, making it one of the most valuable grasses for binding the banks of rivers subject to periodical floods. It is occasionally found along the coast in brackish marshes and sometimes upon sandy soils, and possibly may be employed with advantage for binding drifting sands or those liable to be shifted by high tides. The rootstocks are very



FIG. 72.—Timothy. (*Phleum pratense*.)

strong, and when the grass is once established scarcely anything can remove it. The young shoots are liked by cattle and the mature stems make the best of thatch. It is very widely distributed throughout the temperate regions of both hemispheres, growing along river banks, borders of lakes, etc.

***Phragmites roxburghii* Kth.**

A stout, erect grass, 8 to 12 feet high, with broad, flat leaves, and large, nodding panicles 18 inches long or more. This grass is closely related to our common reed (*Phragmites communis*). It is a native of southern Asia, being common on the plains of northern India, growing near water. The stems are used for making chairs, baskets, and the pipes of Hukahs, and in Bengal mats are made of the split stems. (Duthie.)

***Piptatherum multiflorum*. (See *Oryzopsis multiflora*.)**

***Pleuraphis rigida*. (See *Hilaria rigida*.)**

***Poa alpina* Linn. Mountain Spear-grass; Mountain Poa.**

This is a species of the mountain regions of the New England and Western States, extending northward almost to the limits of polar vegetation. It is a slender perennial, from 1 to 2 inches to 1 foot high, usually about 6 inches, with rather broad leaves and spreading panicles of comparatively large spikelets. Of no recognized agricultural value.

***Poa alsodes* Gray. Wood Spear-grass.**

A slender, erect perennial, 1 to 3 feet high, with flat leaves and a narrow, rather few-flowered panicle. It is a native, growing upon the wooded hillsides of New England, extending westward to Wisconsin, and southward through New York, Pennsylvania, and Virginia, and the mountain regions of North Carolina and Tennessee. It possesses no recognized agricultural value, but is apparently a good fodder grass, and may possibly prove of value in cultivation in woodland parks. Other closely related species of *Poa* extend westward across the continent.

***Poa amabilis*. (See *Eragrostis amabilis*.)**

***Poa andina*. (See *Poa arida*.)**

***Poa annua* Linn. Low Spear-grass; Spear-grass; Annual Meadow-grass; Dwarf Meadow-grass; Early Meadow-grass; May-grass; Goose-grass; Suffolk-grass; Six Weeks-grass.**

A low, spreading annual, with erect or ascending somewhat flattened stems, 2 to 12 inches high. This is an introduced grass, common in every dooryard and about dwellings and cultivated grounds. It may be found in bloom in the Southern States in almost every month in the year. It often forms a considerable ingredient in poorly kept lawns, as a result of its spontaneous growth.

***Poa aquatica*. (See *Glyceria aquatica*.)**

***Poa arachnifera* Torr. Texas Blue-grass.**

A strong-growing perennial, 1 to 3 feet high, with extensively creeping rootstocks, long leaves, and narrow, densely flowered panicles. This grass is apparently dioecious. The pistillate or seed-bearing plants have the spikelets densely woolly, while the male spikelets are smooth. It is a native of Texas, but is now well known in most of the Southern States, where it has been introduced into cultivation, having been highly recommended as a permanent pasture grass. It may be propagated by seeds or "root cuttings," and these can be obtained from leading seedsmen. It makes its principal growth during the winter months, coming into bloom in the latter part of April or early in May. It makes a good

sod and withstands well the heat of summer and protracted drought. Owing to the woolliness of the seeds, they are difficult to sow, and as they are rather expensive this grass has not been so extensively propagated as it otherwise would have been. A somewhat troublesome, but more certain, method of propagation is by root cuttings. These may be planted at any time during the fall or early spring months, being set out in rows 2 feet apart and 6 to 10 inches apart in the rows. The retail price of the seed, according to New York catalogues, is \$3 per pound.

Poa arida Vasey. Bunch Spear-grass; Bunch-grass; Mountain Spear-grass.

A smooth, upright perennial, 1 to 2 feet high, with rather rigid, sharp-pointed leaves, and a close or narrow panicle 2 to 3 inches long. This grass is a native of the Rocky Mountain region, from the British Possessions southward to Arizona. It has short, creeping rootstocks, and although more rigid than many species of *Poa*, it may prove valuable as a pasture grass in the dry regions of the West.



FIG. 73.—Bunch Red-top. (*Poa buckleyana*.)

Poa brevifolia. (See *Poa flexuosa*.)

Poa buckleyana Nash. Bunch-grass; Bunch Red-top. (Fig. 73.)

Rather slender, 1 to 2 feet high, with no creeping rootstock, very narrow root leaves, and contracted panicles of usually purplish spikelets. It is a perennial, and a native of the Rocky Mountain regions, growing on the lower foothills and in the valleys. It grows in bunches, not forming a turf, and is regarded by the ranchmen as one of the most valuable "bunch grasses" of the cattle ranges. It has never been introduced into cultivation, but is deserving of attention, for it responds readily to improved conditions, and when growing along streams or in irrigated land makes a luxuriant growth of foliage, and often attains a height of 2 or 3 feet. There are many species of *Poa* native to the northern portion of our country, particularly in the Northwest, and all are tender, nutritious, pasture grasses. Wherever grasses grow, from the seashore to highest mountain tops, from one arctic zone to the other, the genus *Poa* has its representatives.

Poa caespitosa Forst. var. Silver Tussock.

A large tussock grass, native of Australia and New Zealand, and in the latter country the most abundant of all the tussock grasses. It grows to the height of 3 feet, and has very long, almost filiform, rigid leaves. It is neglected by stock, but the remarkably tough herbage renders it excellent for the manufacture of paper, a purpose for which it is largely employed. (Kirk.)

Poa californica Vasey. California Blue-grass.

Widely distributed in the Rocky Mountain region and on the Pacific Slope, extending southward through Arizona into Mexico. It grows in tufts to the height of 1 to 2 feet, has numerous long root-leaves, and short, compact heads or panicles. It is tender, and affords a large amount of excellent grazing in the regions where it grows abundantly, and may prove a valuable acquisition to the forage grasses of the Atlantic States.

Poa compressa Linn. Creeping Spear-grass; Blue-grass; Smaller Blue-grass; English Blue-grass; Creeping Poa; Wire-grass; Flat-stalked Meadow-grass; Flat-stalked Blue-grass; Canadian Blue-grass.

A slender perennial, with much-flattened stems, 6 to 20 inches high, and small, narrow panicles. This grass has extensively creeping rootstocks, and forms a

strong turf. It is a native of Europe, which has become thoroughly naturalized, and is now very widely distributed over our territory. It is closely related to Kentucky Blue-grass, but is more decidedly blue in color, and is readily distinguished from that species by its strongly flattened stems, lower habit of growth, and smaller panicle. It is the "Blue-grass" of the farmers of the New England and Middle States. It will grow upon a great variety of soils, even upon those so poor and thin as to exclude the growth of other grasses. In cultivated lands it is liable to become troublesome, owing to its creeping rootstocks. There is perhaps no better pasture grass for dry and poor soils, particularly in the Eastern and Middle States. It is especially valuable for dairy pastures; cows feeding on it yield the richest milk and finest butter. On good land it becomes sufficiently tall for hay, and as it shrinks very little in drying, the hay is heavy in proportion to its bulk. Seed is advertised by leading firms at \$14 per 100 pounds.

Poa elegans. (See *Eragrostis ciliaris.*)

***Poa flabellata* Hook.** Tussock-grass.

A native of Falkland and adjacent islands, which has attracted the attention of travelers by its stout habit of growth and evident nutritious qualities. The flowering stems are 5 to 8 feet high, and these are often exceeded by the numerous radical leaves. This grass grows in great tussocks, 1 to 4 or 5 feet across. The stems and long leaves are used for thatch. "It loves a rank, wet, peat bog, with the sea spray dashing over it, and wherever the waves beat with greatest vehemence and the saline spray is carried farthest, there the tussock grass thrives the best, provided, also, it is on the soil it prefers." It thrives in cold countries near the sea in pure sand at the edge of peat bogs. The base of the stem is edible, having a taste of mountain cabbage, a species of palm. The introduction of this grass to certain points along our northern seaboard, where other grasses will not thrive or where there is danger of encroachment upon the land by the sea, may be desirable. The nutritious qualities of the grass and its furnishing good fodder the year round upon the Falkland Islands has been repeatedly noted by authors.

***Poa flexuosa* Muhl.** Southern Spear-grass.

A slender, tufted woodland grass, 1 to 3 feet high, ranging from Delaware and Pennsylvania southward, blooming early in the spring. It has no recognized agricultural value, but might be worth cultivating in dry soils under the shade of trees, in which situations it grows naturally.

***Poa foliosa* Hook. f.**

A stont perennial, 2 to 3 feet high, with very long and rather broad leaves, and panicles 6 to 10 inches long. It forms large tussocks, and in habit resembles the Tussock-grass (*Poa flabellata*) of the Falkland Islands. It is less hardy, however, and is spoken of as being a very productive grass of the highest value for fodder or silage.

***Poa laxa* Haenk.** Wavy Meadow-grass; Alpine Meadow-grass.

A slender species, 6 inches to a foot high, found upon the mountain tops in New England and New York, ranging northward. It also occurs on the mountains of Europe. It has no recognized agricultural value.

***Poa nemoralis* Linn.** Wood Meadow-grass.

The larger forms of this are hardly to be distinguished from *Poa serotina*, and have a similar range. It will, however, grow in a drier soil, excessive moisture being harmful to it. In Montana this species ascends to the altitude of 9,000 feet. At this elevation it is dwarfed in habit, but at lower elevations it becomes taller

and affords excellent forage. There are several varieties of this grass in the Rocky Mountains and the Northwest, some of them growing upon the dry foothills and bench lands. The larger forms are well adapted for hay. It is less productive than many others, and its cultivation is not recommended, excepting in shady parks or open woodlands where an increase of forage is desired, or in shaded lawns, and then only in the Northern and Middle States.

Poa pratensis Linn. Kentucky Blue-grass; Blue-grass (in Kentucky and Tennessee); Green-grass; June-grass (in New England); Smooth Meadow-grass; Common Spear-grass; Spear-grass; English-grass; Smooth-stalked Meadow-grass. (Fig. 74.)

This is apparently native throughout the temperate regions of the northern hemisphere. It ranges from Labrador to South Carolina, westward to the Pacific Coast, and northward to Alaska. In the limestone regions of Kentucky and



FIG. 74.—Kentucky Blue-grass. (*Poa pratensis*.)

Tennessee it attains its greatest perfection and is there regarded as the king of pasture grasses. It requires a good soil containing some lime, in order to yield profitable crops. It is largely employed in the Eastern and Middle States as a lawn grass, for which use it is well adapted. It makes a good, firm sod, and is particularly well suited for turfing the slopes of terraces and embankments, where the soil is good. There are several varieties, which differ chiefly in the breadth and length of the leaves, particularly those at the base of the stem. It is not so well adapted for the production of hay as it is for pasturage. It should enter into all mixtures designed for permanent pasture. The slender stems of this grass afford an excellent material for the manufacture of the finer kinds of Leghorn hats. Good and well-cleaned seed should have 95 per cent purity and 50 per cent germinating power. The power of germination, however, is usually much below this figure. When used for lawns, sow at the rate of 3 bushels per acre. According to Stebler and Schroeter, the seeds should never be covered, but only rolled after sowing, because they germinate better in the light than in darkness.

Poa serotina Ehrh. False Red-top; Fowl Meadow-grass; Duck-grass; Swamp Wire-grass.

A native of northern Europe and the northern portions of our own country, growing naturally in wet meadows and along the low banks of streams. It attains the height of 2 to 3 feet, or even 4 feet in rich, moist soils, and has an expanded, nodding panicle of rather small, purplish or "bronzed" spikelets. It is found in nearly all parts of New England, and often forms a very considerable and valued portion of the native hay of the low meadows. It has been cultivated to some extent, but should only be used in mixtures, as it does not make a good sod when sown alone. It blooms in July and August.

Poa sudetica Haenke. Silesian Meadow-grass.

A broad-leaved, coarse, and rather stiff *Poa*, with stems 2 to 3 feet high. It is a

native of Europe, growing chiefly in the forests of the mountain regions. It does not succeed well in open meadows, but it may have some value for woodland parks or pastures in the Middle and Northern States.

Poa tenuifolia. (See *Poa buckleyana*.)

Poa trivialis Linn. Rough Meadow-grass; Roughish Meadow-grass; Rough-stalked Meadow-grass; Green-grass; Orcheston-grass; Common Meadow-grass.

An erect perennial, 1 to 3 feet high, with an open, spreading panicle, closely related to Kentucky Blue-grass, from which it differs in having no conspicuous root-stocks and the stem being distinctly rough below the panicle. It has been cultivated for many years in England, and is now highly esteemed as an ingredient in mixtures for permanent pastures. It succeeds best where the climate and soil are rather moist and cool, but is not adapted to sandy soil. In northern Italy this grass is known as the "queen of forage plants," but elsewhere, particularly in this country, it is not so highly esteemed, its principal use being to form bottom grass in permanent pastures. Seed of good quality should have 95 per cent purity and 50 per cent germination. When sown alone $1\frac{1}{2}$ to 2 bushels of seed are required per acre.

Pollinia eriopoda. (See *Ischæmum angustifolium*.)

Pollinia fulva Benth. Sugar-grass.

A slender or rather stout perennial grass, 1 to 4 feet high, with narrow leaves and two to three terminal spikes, which are clothed with brown, silky hairs. It is a native of Australia, found throughout all the colonies of that country, growing chiefly on the richest soils and on deep alluvial flats bordering rivers and creeks. It is productive, and much prized by cattlemen. The name "sugar grass" is applied to this species on account of the sweetness of its stems and foliage. Mr. Fred Turner recommends it for cultivation on good land, especially in grazing districts, and he speaks of it as being a good grass to plant on the banks of rivers, creeks, and dams, as its strong, penetrating roots would help to bind the soil and prevent its being washed away by heavy rains or floods. This grass is classed as a variety of *Pollinia cummingii* Nees, by Hackel.



FIG. 75.—Redfield's-grass. (*Redfieldia flexuosa*.)

Polypogon monspeliensis Desf. Beard-grass.

A smooth annual grass, 6 inches to 2 or 3 feet high, with bearded, one-flowered spikelets crowded in dense spike-like panicles. A native of western and southern Europe, north Africa, western Asia, and India. Introduced into this country; now widely scattered through the Southern States, Southwestern Territories, and California. Of no agricultural value, but sometimes used as an ornamental.

Psamma arenaria. (See *Ammophila arenaria*.)

Redfieldia flexuosa Vasey. Redfield's-grass; Blow-out-grass. (Fig. 75.)

A stout, native perennial, 18 inches to 4 feet high, with long, narrow leaves, and diffusely spreading panicles, growing in the sandy districts of Nebraska, Colorado,

and Kansas. It has deeply penetrating and widely spreading underground stems or rhizomes, making it a valuable species for binding drifting sands. It is a characteristic grass of the sand hills of central Nebraska, growing in the drifting sands and "blow-outs," and is a conspicuous and almost the only grass found on the sand dunes south of the Arkansas River, near Garden City, Kans.

Rottboellia. Rat-tail-grass.

The native species of *Rottboellia* are branching, leafy perennials, with slender, cylindrical, many-jointed spikes, which readily break up. They are found chiefly in the pine-barren swamps of the Gulf States. Of little agricultural value in this country. *Rottboellia compressa*, a native of southern Asia, south Africa, and Australia, where it is called Mat-grass, has creeping or ascending flattened stems, rather short leaves, and slender spikes. In some parts of Australia it is highly esteemed for pasturage, and is said to retain its greenness throughout the year in dry climates. It is not injured by light frosts. The prostrate stems sometimes attain the length of 5 or 6 feet. A closely related species, *R. fasciculata*, occurs on the lower Rio Grande.

Saccharum ciliare Anders.

A tall, handsome grass of India, with smooth stems 8 to 10 feet high, long leaves, and large, showy panicles of silky-hairy flowers. Used in the manufacture of matting, rope, and paper, and for thatching. The stems are made into sieves, screens, and baskets. The thicker portion of the stems is used for lining wells, and in making chairs and couches. The leaves are sometimes used for fodder and when young the grass is grazed by cattle.

Saccharum officinarum L. Sugar cane.

A stout grass with many-jointed stems, 8 to 15 feet high, broad leaves 3 to 4 feet long, and long (16 to 32 inches), pyramidal panicles. Native country unknown, but sparingly spontaneous in the South Sea Islands, where it blossoms freely. Cultivated in all tropical countries, extending northward into Spain and Alabama. Propagated chiefly by cuttings of the stems. There are many varieties, distinguished chiefly by the color and height of stem. The leaves are sometimes used for fodder, and to a limited extent also in paper making. The cane is cultivated, however, for its sweet juice, which yields from 12 to 20 per cent sugar. Under favorable circumstances an acre of ground will produce about 20 tons of cane. In this country the production of cane sugar on a commercial scale is practically limited to the State of Louisiana. The sugar production of that State in 1889 was 292,124,050 pounds. The world's production of cane sugar is about 3,000,000 tons, more than one-third of which is produced by the West Indies. Molasses is a product of sugar cane (the uncrystallizable sugar), and rum is made from molasses. Refuse cane, from which the juice has been expressed, yields a strong fiber, and in parts of India is used for torches, etc.

Saccharum sara Roxb.

Stout, erect, 8 to 14 feet high, with long leaves, the lower ones 4 to 8 feet, and densely flowered panicles 1 to 2 feet long. A native of India. At Jeypoor it is extensively used as a sand binder, for which purpose it has proved well suited.

Saccharum spontaneum Linn.

A stout perennial, 5 to 15 feet high, with extensively creeping rootstocks, long, narrow leaves, and a narrow, woolly panicle 1 to 2 feet long. A native of India where it is a favorite fodder for the buffaloes, and is also given to elephants when young. Where not esteemed too valuable as pasturage for buffaloes it is used for thatching dwellings.

Schedonnardus texanus Steud. Texan Crab-grass; Slender Tail-grass; Crab-grass; Wire-grass.

A low, diffusely branching annual, with short, narrow leaves and slender paniculate spikes. The tufted stems are from 3 inches to nearly 3 feet long. It is a native

ranging from Montana southward to Texas and westward to California. Grows in dry, thin soil, and is of no agricultural value.

***Secale cereale* Linn. Rye.**

An annual, 4 to 6 feet high, with flat leaves and a terminal, somewhat flattened, bearded spike 4 to 6 inches long. The rye crop of the United States in 1895 was 27,210,070 bushels, nearly half of which was produced in the States of Pennsylvania, New York, and Wisconsin. Rye is more largely cultivated in central and northern Europe than in America, and the grain is there very largely used for making bread. It is comparatively little used in this country for that purpose, being chiefly employed in the manufacture of malt liquors. The straw, which is longer than that of other grains, and more uniform in size throughout, is employed in the making of a great variety of articles, such as paper, hats, bonnets, mats, slippers, toys, and fancy articles. Rye straw is little



FIG. 76.—German Millet. (*Setaria germanica*.)



FIG. 77.—Yellow Foxtail. (*Setaria glauca*.)



FIG. 78.—Italian Millet. (*Setaria italica*.)

valued for fodder, but when green it is esteemed as a forage plant, and is sometimes sown for this purpose in the Southern States, cattle being allowed to graze it during the fall and winter months. For winter grazing it should be sown upon well-prepared land early in August, when it will be ready to pasture or to cut green in the latter part of October, and may be grazed throughout the winter months.

***Setaria germanica*.** (See *Setaria italica*.)

***Setaria glauca* Beauv.** Yellow Foxtail; Bottle-grass Foxtail. (Fig. 77.)

An erect annual, 1 to 2 feet high, with flat leaves, and a bristly, cylindrical, spike-like, densely flowered panicle 1 to 3 inches long. This grass is widely distributed throughout the tropical and warmer temperate regions of the world, growing

as a weed in cultivated grounds. It is especially common in the Southern States, where it continues to bloom throughout the season, from June to October. It is distinguished from *Setaria viridis* by its somewhat larger spikelets and more widely spreading yellowish bristles.

Setaria italica Kth. German Millet; Hungarian-grass; Bristly Foxtail; Italian Millet; Bengal-grass; Cat-tail Millet; Golden Millet; Dakota Millet. (Fig. 78.)

This grass, in some of its varieties, has been cultivated in the East for many centuries, and in some parts of India and Trans-Caucasia it still forms an important article of food. Its culture extends back to an early date in Egypt, and in the lake dwellings of the stone age it is found in such quantities that it must be regarded as the main bread supply of the prehistoric peoples (Hackel). In Europe and in this country it is cultivated to some extent for fodder and for the seed, the latter being used chiefly for fowls. It grows rapidly, and may be cut within 60 or 65 days from the time of sowing. If used for fodder, it should be cut just as it begins to head, before blooming, for when more advanced it is apt to be injurious to stock fed upon it. When cut in good season, it is one of the most valuable of soiling plants. *Setaria germanica* (fig. 76) is only a variety of *Setaria italica*, distinguished by its smaller, more compact, and erect heads, the bristles of which are usually purplish. Sow 2 to 3 pecks per acre for hay. One peck is sufficient when sown for seed.

Setaria macrochaeta Spr.

An ornamental from India, related to Italian millet, with very long and purple-tinted awns.

Setaria verticillata Beauv. Bristly Foxtail; Stickers.

Has about the same wide distribution as *Setaria glauca*, but is much less common in the United States. It is rarely found except in waste town lots and about dwellings in the Atlantic States. The bristles in this species are barbed downward, on account of which the "heads" cling to clothing or other objects with which they may come in contact. A weed.

Setaria viridis Beauv. Green Foxtail; Pigeon-grass; Green Pigeon-grass; Bottle-grass; Wild Millet.

Similar in habit to *Setaria glauca*, with about the same distribution, and equally common in this country, appearing as a weed in all cultivated grounds. It begins to bloom a little earlier than the Yellow Foxtail, the more numerous spikelets are smaller, the head or panicle less erect, and the bristles usually green, not yellow, as in that species. The stems are very tough and may be utilized for making paper.

Siegingia sp. (See *Triodia*.)

Sorghum cernuum. Chicken Corn; Guinea Corn; White Egyptian Corn. (See *Andropogon sorghum*.)

Sorghum halepense. (See *Andropogon halepensis*.)

Sorghum nutans. Indian-grass; Wood-grass; Oat-like Indian-grass. (See *Andropogon nutans*.)

Sorghum saccharatum. Sweet Sorghum; Chinese Sugar cane; African Cane; Broom Corn. (See *Andropogon sorghum*.)

Sorghum vulgare (now referred to *Andropogon sorghum* Brot. var. *vulgaris*). Sorghum; Sugar Cane; Broom Corn; Indian Millet; Chinese Wheat; Ivory Wheat; Pampas Rice; Chinese Sugar Cane; African Corn; Guinea Corn; Doura Corn; Chocolate Corn; Great Millet; Oregon Rice. (See *Andropogon sorghum*.)

***Spartina cynosuroides* Willd.** Cord-grass; Fresh-water Cord-grass; Marsh-grass; Bull-grass; Thatch-grass; Slough-grass. (Fig. 79.)

Stout, with erect, simple stems 2 to 9 feet high, flat and long-pointed leaves, and numerous erect or spreading spikes 2 to 5 inches long. This is a native, common along our ocean and lake shores, borders of rivers, etc., ranging from Maine to the Carolinas, and westward to the Pacific. It makes a fair but rather coarse hay when cut early, and has been successfully employed in the manufacture of paper. The strong, creeping, scaly rootstocks of this grass adapt it for binding loose sands and river embankments.



FIG. 79.—Cord-grass.
(*Spartina cynosuroides*.)

***Spartina gracilis* Trin.** Slender Cord-grass.

A species of the plains and Rocky Mountain regions, much resembling the common Fresh-water Cord-grass, although usually smaller. It is a hard, tough grass, with strong, creeping rootstocks, and usually grows in sandy, alkaline soil. The tough leaves and stems may possess some value for paper making.

***Spartina juncea* Willd.** Fox-grass; White Rush; Marsh-grass; Salt-grass; Red Salt-grass; Salt Marsh-grass; Rush Marsh-grass. (Fig. 80.)

A rather slender species, 1 to 2 (rarely 3 to 4) feet high, with two to four slender, erect, or widely spreading spikes. This is common upon the salt marshes, and is one of the most valued species which go to form the salt hay that these marshes produce. It ranges from Maine southward to Florida and along the Gulf coast to Texas. It is useful for packing glass-ware, crockery, etc., and in the larger towns along the coast is much used

for this purpose. Fox-grass and Black-grass (*Juncus gerardi*) are regarded as the best of the grasses of the salt marshes for the production of hay, and chemical analyses have proven the correctness of this opinion. Salt hay, composed chiefly of these grasses, at average market prices is decidedly cheaper than timothy hay.

***Spartina polystachya* Willd.** Salt Reed-grass.

This resembles Fresh-water Cord-grass, but is usually of larger growth, and has more numerous spikes, often as many as 50 or 60. It is limited to the salt and brackish marshes of the Atlantic Coast, ranging from Maine to Florida.

***Spartina stricta* Roth.** Creek-sedge; Branch-grass; Thatch; Sedge. (Fig. 81.)

An erect and often stout salt marsh grass, with flat leaves, and few to many erect spikes. It varies a good deal in size, the larger form attaining a height of 5 to 8 feet. It grows along the ditches and creeks of the marshes, and is conspicuous by its size, and long, shining leaves, which are of a deep-green color. Smaller forms are found over the marshes away from the ditches, and these often are of a pale green tint, with comparatively short and shining leaves. All the forms are somewhat succulent,



FIG. 80.—Fox-grass.
(*Spartina juncea*.)

and have a rank odor, which is imparted to the milk and butter of cows feeding upon them. It is of little value for fodder, but makes excellent thatch, and is used to some extent for litter and mulching. This is a characteristic grass of the salt marshes, and is found along both the Atlantic and Pacific coasts of our country and on the shores of Europe.

Spinifex hirsutus Labill. Spiny Rolling-grass; Rolling Spinifex.

A sand binder of the coasts of Australia, New Zealand, and Tasmania. It has stout, creeping stems, rooting at the joints, and sending up coarse, leafy tufts. The whole plant is clothed with soft hairs. The male and female flowers are borne on separate plants, the latter in globular heads, which fall off at maturity and are driven over the sands by the winds, dropping their seeds as they roll along, or are carried about by the waves and deposited on newly formed sand bars, there to continue the embanking process. It has no value for forage, but in New South Wales is regarded a most useful grass for fixing drift sands when encroaching upon valuable lands. It is readily propagated by cuttings or joints of the stems, is of comparatively quick growth, and is very persistent when once established. It would doubtless be of some value on our own southern and Californian coasts as a sand binder.



FIG. 81.—Creek-sedge.
(*Spartina stricta* var.
glabra.)

Sporobolus airoides Torr. Salt-grass; Fine-top Salt-grass; Guyetta (in part). (Fig. 82.)

A stout, rather coarse, and rigid grass, growing in tussocks in sandy and more or less alkaline or saline soils along rivers and streams, ranging from Montana southward to Texas and westward to California. It has a widely spreading panicle, more open than saccatone, and the grass rarely exceeds 2 feet in height. In some places in Nevada, Utah, and New Mexico it occurs abundantly, and yields a coarse fodder, which is eaten by stock when more tender grasses are not available.

Sporobolus asper Kunth. Prairie-grass.

A slender or rather stout perennial, 1 to 3 feet high, with long and very narrow, nearly setaceous leaves, and a contracted panicle 2 to 4 inches long, which is usually partly or even wholly inclosed within the leaf sheaths. It grows in dry, sterile soil in the Eastern and Southern States, extending westward to Kansas, Indian Territory, and Texas. Although common in some sections, it is not

recognized as possessing any agricultural value. The stems soon become hard and wiry, and are avoided by stock.

Sporobolus asperifolius Thurb. Fine-top Salt-grass.

A low, somewhat creeping grass, 6 to 15 inches high, with numerous short, spreading, acute leaves, and an expanded capillary panicle 3 to 5 inches long. It grows on alkaline plains from Texas northwest to British Columbia, in similar situations as *Distichlis spicata*, and like that species often forms a dense, continuous turf. It grows well on strongly alkaline soil, and may prove valuable for propagation on such lands.

Sporobolus cryptandrus A. Gray.

A strongly rooted perennial, 2 to 3 feet high, with usually narrow, rather densely flowered panicles, which are generally partially inclosed within the upper leaf

sheath. Common on the Western plains and in the Rocky Mountain region. It is a tender species, apparently well liked by stock, and where it occurs abundantly is very generally regarded as an important forage plant. In northern central Kansas it is spoken of as one of the best early grasses, and the same is said of it in Young County, Tex.

Sporobolus heterolepis Gray. Wire-grass; Bunch-grass; Strong-scented Sporobolus.

A rather stout grass, 2 to 3 feet high, with very long lower leaves and loose, open panicle. This grass ranges from New York westward to Dakota and southward to Texas, being most common in the prairie regions of Wisconsin, Illinois, and Missouri. The seeds when bruised emit a strong, rather disagreeable odor. It



FIG. 82.—Fine-top Salt-grass. (*Sporobolus airoides*.)



FIG. 83.—Smut-grass. (*Sporobolus indicus*.)

is said to make a fair quality of hay, and may be worth cultivating in the regions where it grows naturally.

Sporobolus indicus R. Br. Smut-grass; Carpet-grass; Drop-seed-grass; Parramatta, or Tussock-grass (in Australia). (Fig. 83.)

A tufted, wiry, erect perennial, 1 to 3 feet high, with narrow, densely flowered, spike-like panicles 4 to 12 inches long. This grass is widely distributed throughout the warmer temperate regions of the world, and has become quite common in many parts of the Southern States, growing in scattered tufts or patches about dwellings and in dry, open fields. As the season advances, the long, slender panicles often become overgrown by fungus, so that they appear as if attacked by smut, hence the common name "Smut-grass." By some it is looked upon as valuable for forage, but the stems soon become too tough and wiry to be readily eaten by stock, and in fields where this grass occurs it is usually avoided by cattle when other food can be had.

Sporobolus junceus Kunth. Rush-like Drop-seed-grass; Wire-grass.

Common in the dry, pine-barren regions of the Southeastern States. It grows to the height of 18 inches to 2 feet, and is of little or no agricultural value. This and *Aristida stricta* are the grasses known throughout the South as "Wire-grass."

Sporobolus orientalis Kth. Usar-grass.

A wiry, creeping perennial, with rather short, rigid leaves and diffuse panicles. It is a native of India, growing upon saline soils, often constituting the entire vegetation of the extensive usar tracts of northern India. A valuable grass for alkaline or saline soils, yielding a liberal supply of fodder where other plants are unable to exist.



FIG. 84.—Saccatone. (*Sporobolus wrightii*.)

Sporobolus serotinus. Late Drop-seed-grass.

A very slender, delicate grass, common in moist, sandy soils from Maine to New Jersey and westward to Michigan. Of no agricultural value.

Sporobolus vaginæflorus Vasey. Southern Poverty-grass; Prairie-grass.

A slender, tufted annual, 6 to 18 inches high, with very short narrow leaves and nearly simple, few-flowered panicles, which are mostly inclosed within the leaf sheaths. This grass grows in dry, poor soils throughout the Atlantic States, extending westward to Missouri and southern Texas. Of little or no agricultural value.

Sporobolus wrightii Munro. "Zacaton," or "Zacate"-grass; Saccatone; Maton (of the Mexicans). (Fig. 84.)

A stout, erect perennial, 4 to 8 feet high, with long, narrow leaves and a slightly spreading panicle 12 to 15 inches long. It grows in great clumps, producing a large quantity of coarse, tough stems and leaves, which, however, in the regions where this grass is native—Arizona and New Mexico—yield a hay which is valued for horses and mules. As a hardy perennial for saline

bottoms subject to flooding or incapable of cultivation, this species deserves notice. The Indians and Mexicans of Arizona and Lower California call all hay grasses "zacate," without any distinction between the species.

Stenotaphrum americanum Schk. Hard-grass; St. Augustine-grass; Mission-grass; Buffalo-grass (in Australia); Pimento-grass (in Jamaica). (Fig. 85.)

This grass has a wide distribution, being found in the tropical and warmer temperate regions of both the Old and New World. In New South Wales it is known as Buffalo-grass, and in Jamaica it is called Pimento-grass. It grows upon every variety of soil, from the apparently sterile sand dunes to heavy clays, but is rarely found far away from the coast. The flattened stems emit fibrous roots at every joint, where they also readily separate, each piece becoming a new center of growth. The leaves are flat or simply folded, blunt or obtuse at the apex, nearly one-fourth of an inch broad and 4 to 10 inches long. The flowering stems grow to the height of 6 inches to a foot or more. St. Augustine-grass grows along our ocean shores as far north as South Carolina, and is extensively used for lawns in Charleston, S. C., and cities in the South near the coast. It is useful for holding sloping embankments, especially those subject to wash. It

is propagated by cuttings or sets, and quickly covers the most sandy yards with a dense, carpet-like growth. In South America the creeping stems are employed in medicine as a diuretic.

***Stipa avenacea* Linn.** Black Oat-grass; Feather-grass.

An erect perennial, 1 to 3 feet high, with very narrow leaves and a loose panicle with a few long-awned spikelets. It grows in dry soil in open woods along thicket borders, ranging from New England to the Southern States and westward to Texas and Wisconsin. Of no agricultural value.

***Stipa comata*.** Needle-grass; Feather-grass; Bunch-grass; Needle-and-Thread.

This is one of the bunch grasses common in the Rocky Mountain region, growing on the dry mesas and foothills. It is a rather stout, leafy perennial, 1 to 3 feet high, with a panicle usually partly inclosed in the upper leaf sheath; the slender awns of the spikelets are 4 to 6 inches long and flexuose. This grass has some value, affording forage of good quality in the regions where it grows abundantly.

***Stipa elegantissima* Labill.**

A native of Australia, with erect, branching stems 2 to 3 feet high, narrow leaves, and loose panicles 6 to 8 inches long. The axis and long, thread-like branches of the panicle are elegantly plumose with fine, spreading hairs, rendering it highly ornamental. Cultivated in gardens.

***Stipa pennata* Linn.** Feather-grass.

A native of Southern Europe, 1 to 2 feet high, growing in dry, open ground, and often cultivated in gardens as an ornamental, the very long, slender awns being clothed with spreading, silky hairs, presenting a very graceful plume-like appearance. A variety of this grass (*Stipa pennata* var. *neo-mexicana*) grows wild in the mountain regions of western Texas and Arizona. It is an elegant form of the species, growing in clumps 6 to 12 inches in diameter, and is deserving the attention of the florist.



FIG. 85.—St. Augustine-grass.
(*Stenotaphrum americanum*.)

***Stipa setigera* Presl.** Bear-grass; Bunch-grass.

A native of California, extending northward to Oregon and eastward through New Mexico and Arizona to Texas.

It is common on the coast ranges and on the foothills of the Sierra Nevada, where it is regarded as one of the most valuable of the native bunch grasses.

***Stipa spartea* Trin.** Porcupine-grass; Devil's Darning-needles; Devil's Knitting-needles; Spear-grass; Arrow-grass; Buffalo-grass (in the Saskatchewan region).

Rather stout, 18 inches to 3 feet high, with long leaves and few-flowered panicles. The stout and twisted awns are 3 to 6 inches long, and at the base of the flowering glume is a long and very sharp-pointed callus. When mature, the awned flowering glumes soon fall off, leaving the large, pale, straw-colored persistent empty glumes, which impart to the panicle a characteristic oat-like appearance. The awns, when dry, are bent and very strongly twisted, but when moistened they gradually untwist, a character which enables the seeds to bury themselves in the ground, this being possible on account of the very sharp callus at the base of the fruiting glume. The same character also renders the seeds of this grass

dangerous to sheep, as they readily become attached to the wool, and may penetrate the flesh of the animal, causing serious injury. Aside from this danger of affecting the quality of the wool, and possibly the life of the sheep, this grass may be considered a good forage plant, as it makes a very good hay, although somewhat coarse. It is particularly common in the prairie regions of Iowa, Nebraska, South Dakota, and Minnesota, extending westward to the Rocky Mountains, where it frequently occurs upon the dry foothills and bench lands.

***Stipa tenacissima* Linn. Esparto-grass.**

A native of the sandy regions of southwestern Europe and northern Africa. It is a tall perennial, with long, stiff, and very tough leaves, from which ropes, baskets, mats, hats, and other articles are woven. The leaves are employed largely in England and this country in the manufacture of paper, for which purpose this grass is superior to straw. It is the most important article of export from Algeria, and from northern Africa and Spain more than 2,000 tons of Esparto are exported to Great Britain annually. "Ten tons of dry Esparto, worth from \$18 to \$25 per ton, can be obtained from an acre under favorable circumstances." The grass will grow on almost any kind of soil, from that which is poor and sandy or gravelly to heavy calcareous and clayey soils. It thrives in the dry and hot climates of northern Africa, where many millions of acres are covered almost exclusively with it. This grass is extensively cultivated in the south of France, and possibly its introduction into some of our Southwestern districts may render profitable, regions now practically worthless. It may be propagated by seeds or by divisions of the root. The latter is the more common method. (See *Lygeum spartum*.)

***Stipa viridula* Trin. Feather Bunch-grass; Bunch-grass; Wild Oat-grass; Wild Oats; Feather-grass. (Fig. 86.)**

A rather slender grass, except in the variety noted below, 1 to 3 feet high, growing in the Rocky Mountain regions and on the foothills and mesas, from British Columbia southward to Mexico and westward to the coast. On good land, under irrigation, this grass attains the height of 3 feet or more, and is by far the most valuable of the Stipas for hay. The leafy culms are terminated by a narrow, many-flowered panicle of comparatively small and rather short-awned spikelets. The seed may be easily gathered. The callus at the base of the fruiting glume is short and barely pointed and not produced into a long, very sharp, spur-like extension, as in Porcupine-grass. A variety of this species, called Sleepy-grass, occurs in the mountain valleys of western Texas, ranging northward to Colorado. It is a robust form, 3 to 6 feet high, and when green is said to have a narcotic effect upon horses and cattle feeding upon it.

***Themeda ciliata*. (See *Anthistiria ciliata*.)**

***Thuarea sarmentosa* Pers.**

A low, extensively creeping grass, rooting at the joints, with ascending flowering branches, short leaves, and slender spikes about an inch long. A native of Ceylon, northern Australia, etc., growing on the sands of the coast. It is a tender grass, and may be useful in binding coast sands in tropical countries or in the formation of lawns.

***Thysanolaena acarifera* Nees. Tiger-grass.**

A tall and showy species of southern Asia, with large panicles of minute spikelets. It becomes a weed among cultivated crops. A decoction of the root is used as a rinse for the mouth in cases of fever.

***Trichloris blanchardiana* Scribn.**

A perennial, 1½ to 3 feet high, with flat leaves, and six to eighteen slender, bearded spikes, which are 2 to 5 inches long, digitate or fasciculate at the apex of the

culm. It has long been known to florists under the name of *Chloropsis blanchardiana*, and is esteemed as an ornamental grass, its attractive appearance making it worthy of attention. It grows in Arizona and Mexico, extending into South America.

***Tricholæna rosea* Nees.**

A South African annual (?), with diffusely branching stems 2 to 4 feet high. The spikelets are in loose panicles, and clothed with reddish, silky hairs. It presents a pleasing appearance when in flower, and the panicles are valued for dry bouquets. It has recently received some attention by agriculturists on account of its very vigorous, rapid growth and productiveness. Experiments made in this country and elsewhere indicate that it possesses much value as a meadow or hay grass in mild climates. Three hundred stems have been counted on a single plant. These stems take root wherever they touch the ground, and an acre has been calculated to yield 30 tons of green fodder in the rich valleys of the Macleay River, New South Wales. It is easily propagated by seed.

***Tricuspis seslerioides*. (See *Triodia cupræa*.)**

***Triodia acuminata* H. B. K. White Tuft-grass.**

A native of the arid regions of Texas, New Mexico, and Arizona, growing in dry, gravelly soil on the mesas and foothills. It is a low, tufted perennial 4 to 12 inches high, with a short, spike-like panicle composed of a few crowded spikelets. It produces numerous rootleaves, but is of comparatively little value as a forage plant.

***Triodia cupræa* Jacq. Tall Red-top; Fall Red-top; Purple-top.**

A stout, erect native perennial, 3 to 5 feet high, with long, flat leaves and an ample, spreading, usually purple panicle 6 to 12 inches long, growing in dry or sandy fields from southern New York southward and westward to Missouri, blooming in August and September. It is a striking grass, and often covers considerable areas, but is apparently not liked by stock, and is not recognized as possessing any agricultural value.

***Triodia exigua* Kirk.**

A little alpine grass endemic in New Zealand. It forms even plots of turf, often many square yards in extent; the leaves are firm, short, and shining; the compact growth of the turf or sward prevents the encroachment of other grasses or weeds. It is particularly to be recommended for croquet lawns, never requiring mowing (Th. Kirk). In the mountain regions of the West are several of these small turf-forming grasses, which would, if cultivated, make excellent carpet-like lawns in the region of the Northern and Middle States.

***Triplasis purpurea* Chapm. Purple Sand-grass; Sand-grass.**

A native annual, common in the sands along the coast from Massachusetts southward and extending westward to Illinois and Texas. It has rather slender, wiry stems growing in tufts 6 to 12 inches high, and numerous short, spreading



FIG. 86.—Feather Bunch-grass. (*Stipa viridula*.)

leaves. The slender, few-flowered panicles are for the most part included within the leaf sheaths. The fresh stems have an acid taste. Of no agricultural value.

***Tripsacum dactyloides* Linn.** Gama-grass; Sesame-grass; Bull-grass. (Fig. 87.)

A tall, coarse perennial, 3 to 8 feet high, growing in large tufts, and producing a great mass of broad leaves, which when young and succulent are eaten with avidity by all kinds of stock. When abundant it affords a large amount of natural forage, and is valuable to this extent. It has very strong, creeping rootstocks, and the quantity of forage produced is large and of excellent quality. The grass may be deserving of cultivation for forage under certain conditions, and it makes an interesting and attractive plant for lawn decoration or the garden. A rich and rather moist soil is best suited to it.

***Triraphis mollis* R. Br.** Purple Heads.

A native of Australia, 1 to 2 feet high or more, with narrow, dense panicles 6 to 10 inches long. It is a perennial, growing chiefly in the arid districts of the interior, and may prove valuable for propagation in such regions because of its drought-resisting qualities. Its habit of growth and purplish heads render it quite attractive in appearance, and it has been recommended as an ornamental grass.

***Trisetum flavescens*.** (See *Trisetum pratense*.)

***Trisetum palustre* Linn.** Marsh Oat-grass.

A smooth, upright, native perennial, not infrequent in moist meadows in low grounds, ranging from southern New York southward and westward to Illinois. The slender stems attain the height of 2 or 3 feet and bear loosely flowered, narrow, yellowish-green panicles. This plant has never been cultivated, but it may possess some value as an ingredient in mixtures for permanent pastures.

***Trisetum pratense* Pers.** Yellow Oat-grass; Golden Oat-grass.

A rather slender, loosely tufted perennial, growing to the height of 2 feet. It is a native of Europe, northern Africa, and western Asia. It occurs along roadsides, in open fields, and on grassy mountain slopes, where its presence is said to indicate land of good quality. In Europe Yellow Oat-grass is classed with the best fodder plants and is highly valued for temporary, but more particularly for permanent pastures. It can be grown on almost every variety of soil, is fairly productive, and is readily eaten by stock. This grass has a record of yielding on clayey loam soils 8,167 pounds green grass, 2,858 of hay, and 4,083 of aftermath. In this country it has received little attention. It is quoted in New York seed catalogues, the price ranging from \$70 to \$115 per 100 pounds. Sown only in mixtures.

***Trisetum subspicatum* var. *molle* Gray.** Downy Persoon; Downy Oat-grass.

A slender, erect perennial, 6 to 15 inches high, with soft-downy stems and leaves and a contracted, spike-like panicle 2 to 5 inches long. It is a native of the cooler regions of New England, extending southward along the mountains to the Carolinas. It is common also in the Rocky Mountains from Colorado northward. Of no agricultural value.

***Tristeginis glutinosa*.** (See *Melinis minutiflora*.)

***Triticum caninum*.** (See *Agropyron caninum*.)

***Triticum polonicum* Linn.** Wild-goose Wheat; Montana Rye.

A very striking species or variety of wheat, with large, compressed, and usually bluish-green spikes or heads. The native country of this *Triticum* is not known, but it probably originated in Spain, where it is now cultivated to a considerable extent. It is also cultivated more or less in Italy and Abyssinia. The long and slender fruit resembles rye, but is on the whole larger. It has sometimes been

advertised by some dealers and sold to farmers under the name of Giant Rye. It is inferior to many other varieties, for, although the heads present a fine appearance, the production of kernels is small; consequently the yield of grain is light.

Triticum repens. (See-*Agropyron repens*.)

Triticum sativum Linn. Wheat.

This and its many varieties which have been produced by cultivation is one of, if not the most important of the true grasses. It is one of the oldest of the cultivated cereals, the grains having been found in very ancient Egyptian monuments, dating back to 2,500 to 3,000 B. C. The numerous varieties are distinguished by the firmness of the axis of the spike (continuous), or its brittleness



FIG. 87.—Gama. (*Tripsacum dactyloides*.)



FIG. 88.—Broad-leaved Spike-grass. (*Uniola latifolia*.)

(articulated); by the presence or absence of awns or beard; by the color of the chaff, and color and size of the grain. *Triticum sativum spelta*, of which there are a number of subvarieties, is one of the oldest grains, and was everywhere cultivated throughout the Roman Empire, forming the chief grain of Egypt and Greece. It is still grown to some extent in parts of Europe, notably in northern Spain and southern Germany. In 1895 the wheat crop of the United States was placed at 467,102,947 bushels, while the wheat crop of the world is estimated at 2,400,000,000 million bushels. For a discussion of the classification of the varieties of wheat, see Hackel's True Grasses (English translation), and the Fourth Annual Report of the New York Agricultural Experiment Station, 1885.

Uniola gracilis Michx. Slender Spike-grass.

Slender, 2 to 3 feet high, with long, narrow leaves and contracted, wand-like, nodding panicles 6 to 18 inches long. This is a native perennial, growing in dry soil

along the borders of woods and open thickets, ranging from New York southward near the coast and westward to Tennessee. It is of no recognized agricultural value.

***Uniola latifolia* Michx.** Broad-leafed Spike-grass; Wild Fescue-grass; Wild Oats. (Fig. 88.)

Erect, with rather stout, leafy stems 2 to 4 feet high, and drooping panicles of large, flat spikelets. The leaves are broad and widely spreading, and these, together with the graceful, nodding, open panicles, render it pleasing in appearance and worthy of cultivation for ornament. It has very strong, creeping roots, and is found chiefly along streams and thicket borders from Pennsylvania southward and westward to Illinois. A grass of little or no agricultural value.

***Uniola palmeri* Vasey.**

A stout perennial with branching stems 2 to 4 feet high growing in the tidewater marshes at the mouth of the Colorado River. The seeds form one of the principal food grains of the Cocopa Indians of southern California.

***Uniola paniculata* Linn.** Seaside Oats; Beach-grass; Spike-grass.

A native, with stout, erect stems 3 to 5 feet high, long, rigid leaves, and showy nodding panicles of broad, pale straw-colored spikelets. The panicles are gathered for dry bouquets, and are often seen in our markets, along with the plumes of Pampas-grass. It grows in the drifting sands along the seashore, just above high tide, from Virginia southward to Florida, and along the Gulf Coast westward to Texas. It is an excellent sand binder, its rootstocks being very strong and penetrating deeply into the soil, much like those of Beach or Marram grass, of which it is a southern analogue. The leaves are sometimes cropped by cattle, but the grass is too tough and dry to be of any importance as a forage plant. *Uniola condensata* of similar habit of growth, but with more densely flowered panicles, is found in the sands along the coast of southern California.

***Zea gracillima* var. *variegata* Hort.**

A garden variety of Maize with variegated leaves.

***Zea mays* Linn.** Indian Corn or Maize.

One of the most valued of the cultivated cereals. The many varieties which have originated in cultivation have been variously classified. They differ much in size, in the form, size, color, and hardness of the grain, and in the time required for ripening. Husk Maize, in which the kernels are separately enveloped in broad, herbaceous glumes, may approach the native form, which doubtless had its origin in tropical America. *Mais de coyote*, regarded by some as a distinct species, is said to grow wild in some parts of Mexico. The stems of this variety are branched above, and the numerous small ears are borne in the upper leaf axils all along the branches. The kernels are rounded and depressed, or conical with a rather acute apex pointing forward in two opposite rows, or irregularly arranged in four to six rows. Aside from its great value as a cereal, ordinary field corn is the best of the annual forage plants for soiling, and is also valued and used by many farmers for ensilage, being cut for this purpose when the kernels commence to glaze. Among the many uses of corn may be mentioned that of making cakes and corn bread, mush or hasty pudding, which is boiled corn meal, a very common dish in New England; mixed with rye and wheat flour the corn meal is used in making "brown bread"; green corn, boiled or roasted, is very largely eaten in its season, and canned corn is an important article of food; pickled green corn also is a favorite dish with many; hulled corn, or hominy, prepared by soaking the ripe grain in lye for a certain length of time and then removing the hulls or covering of the kernels, is a favorite dish in New England;

popped corn, obtained by shaking the shelled corn of certain varieties in a suitable dish over live coals or a hot stove, is a luxury with children, and mixed with sugar or sirup is made into corn balls and various kinds of candy; corn and corn meal are largely fed to farm stock in this country, particularly to cattle and hogs; alcoholic liquors in immense quantities are distilled from the grain; corn husks (the leaves covering the ears) are used in making paper, in upholstery, and for filling mattresses. The total corn crop of the United States for the year 1895 was 2,151,138,580 bushels, valued at \$544,985,534. The largest crop of any one State for that year was produced by Iowa, and amounted to 298,502,650 bushels.

***Zizania aquatica* Linn.** Indian Rice; Wild Rice; Water Rice; Tuscarora Rice; Water Oats; Reed. (Fig. 89.)

A tall, erect annual, 3 to 10 feet high, growing in shallow water along rivers and lakes from Canada southward to Florida and westward to Texas. The grain is a favorite food of the reed bird, and the grass is cultivated to some extent by sportsmen with a view to attracting these and aquatic fowl. It grows very rapidly in 1 to 8 feet of water, and matures its seeds in August or early in September. It succeeds best when sown in the fall broadcast in 2 or 3 feet of water having a muddy bottom, but it can be sown in the spring in water from 6 inches to 5 feet deep. Before sowing soak the seeds in water twenty-four hours. Current retail price of the seeds is 25 cents per pound. This grass is abundant in the tide-waters of the rivers of the Middle States, notably in the Delaware below Philadelphia, where it is always designated as "the reeds." The stems are used by coopers for making the joints of barrels intended to hold whisky or petroleum perfectly tight. This grass is the *Manorrin* of the Chippewa Indians, who gather the grain for food.



FIG. 89.—Indian rice. (*Zizania aquatica*.)

***Zoysia pungens* Willd.** Coast Couch-grass; Japanese Lawn-grass.

A creeping maritime grass growing on the sandy shores of tropical and eastern Asia, Australia, and New Zealand. In Australia it is considered an excellent sand-binder, and while valuable for this purpose, it is at the same time an excellent forage plant. Under favorable circumstances it forms a compact turf and affords a large amount of choice pasturage. Constant cropping appears to improve it and increase the density of the turf. In the foreign settlements of China and Japan it is prized as a lawn grass, especially for tennis courts. It is finer-leaved than St. Augustine-grass, and may prove superior to that for lawns in the Southern and Gulf States. The habit of growth of Japanese lawn-grass is very similar to that of Bermuda, but the creeping stems are rather stouter and more rigid and the upright branches or tufts of flowering stems are never so tall, rarely exceeding 6 inches. It may be propagated by root cuttings or by seed. Importations of both roots and seeds from Korea have been successfully grown here, and the grass has proved hardy as far north as Connecticut. The leaves turn brown in the autumn as do those of Bermuda.

COMMON ENGLISH OR LOCAL NAMES OF GRASSES.

[This list serves as an index to the Latin names, which are arranged alphabetically in the body of the work.]

African Cane. *Pennisetum spicatum*. (See page 74.)

Millet. *Eleusine coracana*.

Sugar Cane. *Sorghum saccharatum*.

Alabama Guinea-grass. *Andropogon halepensis*.

Albardine. *Lygeum spartum*.

Alfa-grass. *Stipa tenacissima*.

Alkali-grass. *Distichlis maritima*.

Alpine Meadow-grass. *Poa laxa*.

American Canary-grass. *Phalaris caroliniana*.

Millet. *Setaria italica*.

Andes, Grass of the. *Arrhenatherum elatius*.

Angola-grass. *Panicum spectabile*.

An-kee. *Panicum crus-galli*.

Annual Meadow-grass. *Poa annua*.

Apache Blue-grass. *Agropyron divergens*.

Arabian Millet, or Arabian Evergreen Millet. *Andropogon halepensis*.

Arctic-grass. *Bromus unioloides*.

Arrow-grass. *Stipa spartea*.

Austin-grass. *Panicum texanum*.

Australian Millet. *Andropogon halepensis*.

Oats. *Bromus unioloides*.

Prairie-grass. *Bromus unioloides*.

Austrian Brome-grass. *Bromus inermis*.

Awned Wheat-grass. *Agropyron caninum*.

Awnless Brome-grass. *Bromus inermis*.

Bahama-grass. *Cynodon dactylon*.

Bajree Millet. *Pennisetum spicatum*.

Barley. *Hordeum sativum*.

Barley-grass. *Hordeum pusillum*; *H. murinum*.

Wild. *Hordeum pratense*.

Barn-grass. *Panicum crus-galli*.

Barnyard-grass. *Panicum crus-galli*.

Millet. *Panicum crus-galli*.

Beach-grass. *Ammophila arundinacea*; *Uniola paniculata*.

Bear-grass. *Stipa setigera*.

Beard-grass. *Polypogon monspeliensis*; *Aristida purpurea*; *A. purpurascens*; *A. virgata*. Also applied to species of *Andropogon*.

Cluster-flowered. *Andropogon macrourus*.

Creeping. *Oplismenus setarius*.

Finger-spiked. *Andropogon provincialis*.

Naked. Generic name for species of *Gymnopogon*.

Satin. *Muhlenbergia sylvatica*.

Short-leaved. *Gymnopogon brevifolius*.

Silver. *Andropogon argyræus*.

Virginia. *Andropogon virginicus*.

Western. *Aristida purpurea*.

Woolly. *Erianthus saccharoides*.

Bearded Darnel. *Lolium temulentum*.

Wheat-grass. *Agropyron caninum*.

Beckman's-grass. *Beckmannia erucaeformis*.

Bene. *Andropogon squarrosus*.

Bengal-grass. *Setaria italica*.

Bent-grass, (or Bent.) Generic name for species of *Agrostis*.

Panic. *Panicum agrostoides*.

Rough-leaved. *Agrostis asperifolia*.

Bent, Blue. *Andropogon provincialis*.

Brown. *Agrostis canina*.

Creeping. *Agrostis stolonifera*.

Dog's. *Agrostis canina*.

English. *Agrostis alba*.

Fine. *Agrostis vulgaris*.

Marsh. *Agrostis alba*.

Purple. *Calamovilfa brevipilis*.

Reed. *Calamagrostis canadensis*.

Rhode Island. *Agrostis vulgaris*; *A. canina*.

Rough. *Agrostis scabra*.

Southern. *Agrostis elata*.

Spider. *Agrostis arachnoides*.

White. *Agrostis alba*; *Andropogon scoparius*.

Woolly. *Calamovilfa longifolia*.

Bermuda-grass. *Cynodon dactylon*.

Bhabur-grass. *Ischæmum angustifolium*.

Big Blue-stem. *Andropogon provincialis*.

Bitter Panic-grass. *Panicum amarum*.

Black Bent. *Panicum virgatum*.

Bunch-grass. *Hilaria jamesii*.

-fruited Mountain Rice. *Oryzopsis melanocarpa*.

Gramma. *Bouteloua oligostachya*; *Muhlenbergia pungens*; *Hilaria mutica*.

Oat-grass. *Stipa avenacea*.

Blady Grass. *Imperata arundinacea*.

Blow-out-grass. *Redfieldia flexuosa*; *Eragrostis tenuis*; *Muhlenbergia pungens*.

Blue Bent (of Rhode Island). *Andropogon provincialis*.

Gramma. *Bouteloua oligostachya*.

Blue-grass. *Poa pratensis*; *Poa compressa*; *Andropogon provincialis*; *Agropyron spicatum*; *Andropogon affinis*.

Apache. *Agropyron divergens*.

English. *Poa compressa*; *Festuca elatior*.

Kentucky. *Poa pratensis*.

Smaller. *Poa compressa*.

Texas. *Poa arachnifera*.

Blue-joint-grass. *Calamagrostis canadensis*; *Agropyron spicatum*; *Andropogon provincialis*.

Blue-stem. *Agropyron spicatum*; *Andropogon provincialis*.

Big. *Andropogon provincialis*.

Bushy. *Andropogon nutans*.

Colorado. *Agropyron spicatum*.

Little. *Andropogon scoparius*.

Bonnet-grass. *Agrostis alba*.

Borden's-grass. *Agrostis vulgaris*.

Bottle Brush. *Asprella hystrix*.

-grass. *Setaria glauca*; *S. viridis*.

Bottom-grass. *Panicum texanum*.

Branch-grass. *Spartina stricta* var. *glabra*.

Branching Foxtail. *Chloris verticillata*.

Spear-grass. *Eragrostis tenuis*.

Bristly Foxtail. *Setaria italica*; *S. verticillata*.

Muskit or Mesquit. *Bouteloua hirsuta*.

Brome-grass. Generic name for species of *Bromus*.

Fringed. *Bromus ciliatus*.

Smooth. *Bromus racemosus*.

Soft. *Bromus mollis*.

Western. *Bromus pumpellianus*.

Willard's. *Bromus secalinus*.

Brook-grass. *Andropogon macrourus*.

Broom Corn. *Andropogon sorghum*, variety.

Corn Millet. *Panicum miliaceum*.

-grass. *Andropogon scoparius*; *A. virginicus*.

Sedge. *Andropogon virginicus*. Also applied sometimes to *Andropogon scoparius*.

Brown Bent-grass. *Agrostis canina*.

Millet. *Panicum miliaceum*.

-top. *Agrostis*, species growing on the salt marshes.

Brush, Bottle. *Asprella hystrix*.

Buffalo-grass. *Buchloë dactyloides*; *Bouteloua oligostachya*; *Panicum texanum*; *Stipa spartea* (in the Saskatchewan region); *Stenotaphrum americanum* (in Australia).

Bunch-grass. *Festuca scabrella*.

Bull-grass. *Spartina cynosuroides* and *Paspalum plicatulum*; *Tripsacum dactyloides*.

Bulrush Millet. *Pennisetum spicatum*.

Bunch-grass. *Oryzopsis cuspidata*; *Poa buckleyana*; *Stipa viridula*; *S. comata*; *Sporobolus heterolepis*; *Calamagrostis sylvatica*, etc. This name is applied by the ranchmen in the West to many of the native grasses.

Buffalo. *Festuca scabrella*.

Early. *Eatonia obtusata*.

Feather. *Stipa viridula*.

Great. *Festuca scabrella*.

Pine. *Festuca ovina*, variety.

Wire. *Agropyron divergens*.

Bunch Hair-grass. *Muhlenbergia trichopodes*.

Red-top. *Poa buckleyana*.

Spear-grass. *Poa arida*.

Burden's-grass. *Agrostis vulgaris*; *A. canina*.

Bur-grass. *Cenchrus tribuloides*.

Bushy Blue-stem. *Andropogon nutans*.

Buzzard-grass (local). *Eleusine indica*.

Caffre Corn. *Andropogon sorghum* variety.

Calf-kill. *Holcus lanatus*.

California Oat-grass. *Danthonia californica*.

Timothy. *Phalaris caroliniana*.

Canada Lyme-grass. *Elymus canadensis*.

Canadian Small-reed. *Calamagrostis canadensis*.

Canary-grass. Generic name for species of *Phalaris*; applied especially to *Phalaris canariensis*.

Reed. *Phalaris arundinacea*; *P. caroliniana*.

Southern. *Phalaris caroliniana*.

Stewart's. *Phalaris caroliniana*.

Candy-grass. *Eragrostis minor*.

Cane. *Arundinaria gigantea*.

African. *Pennisetum spicatum*; the same as *P. typhoideum*.

Chinese Sugar. *Andropogon sorghum*.

Large. *Arundinaria macrosperma*.

Maiden. *Panicum curtisii*.

Small. *Arundinaria tecta*; *Panicum divaricatum*.

Sugar. *Saccharum officinarum*.

Carpet-grass. *Sporobolus indicus*; *Paspalum platycaule*.

Catch-fly-grass. *Leersia lenticularis*.

Cat's-tail-grass. *Phleum pratense*.

Cat-tail Millet. *Pennisetum spicatum*; *Setaria italica*.

Chandler's-grass. *Agropyron repens*.

Charleston Lawn-grass. *Stenotaphrum americanum*.

Cheat. *Bromus secalinus*.

Chess. *Bromus secalinus*.

Soft. *Bromus mollis*.

Swamp. *Bromus ciliatus*.

Upright. *Bromus racemosus*.

- Chess, Wild.** *Bromus kalmii*.
Chicken Corn. *Andropogon sorghum cernuus*.
Chinese Sugar Corn. *Andropogon sorghum*.
 Wheat. *Andropogon sorghum*.
Chocolate Corn. *Andropogon sorghum*.
Citronella. *Andropogon nardus*.
Close-flowered Drop-seed-grass. *Sporobolus compressus*.
Cluster-flowered Beard-grass. *Andropogon macrourus*.
Coast Couch-grass. *Zoysia pungens*.
Cock's-foot. *Panicum crus-galli*.
 Rough. *Dactylis glomerata*.
Cockspur. *Cenchrus echinatus*.
 Bur. *Cenchrus tribuloides*.
Colorado-grass. *Panicum texanum*.
 Blue-stem. *Agropyron spicatum*.
 Sand-grass. *Andropogon hallii*.
Comb-grass, Meadow. *Eragrostis pectinacea*.
Common Manna-grass. *Glyceria fluitans*.
 Meadow-grass. *Poa trivialis*.
 Sea-reed. *Ammophila arundinacea*.
Concho-grass. *Panicum fasciculatum*; *P. texanum*.
Cord-grass, Fresh-water. *Spartina cynosuroides*.
Corn-Beads. *Coix lachryma*.
Corn, Broom. *Andropogon sorghum* var.
 Chicken. *Andropogon sorghum* var. *cernuus*.
 Chocolate. *Andropogon sorghum* var.
 Durra. *Andropogon sorghum* var. *vulgaris*.
 Guinea. *Andropogon sorghum* var. *cernuus*.
 Indian. *Zea mays*.
 White Egyptian. *Andropogon sorghum* var. *cernuus*.
Cotton-grass. *Panicum leucophæum*.
Couch Brome. *Bromus inermis*.
 -grass. *Agropyron repens*.
 -grass, Coast. *Zoysia pungens*.
 -grass, Indian. *Cynodon dactylon*.
Crab-grass. *Panicum sanguinale*; *Schedonnardus texanus*; *Eleusine indica*.
 Slender. *Panicum filiforme*.
 Sprouting. *Panicum proliferum*.
 Texan. *Schedonnardus texanus*.
Creek-Sedge. *Spartina stricta*.
Creeping Beard-grass. *Oplismenus setarius*.
 Bent-grass. *Agrostis stolonifera*.
 Crab-grass. *Panicum serotinum*.
 Meadow-grass. *Eragrostis reptans*.
 Mesquite. *Hilaria cenchroides*.
 Panic. *Panicum repens*.

Creeping Paspalum. *Paspalum repens.*

Poa. *Poa compressa.*

Sea Spear-grass. *Glyceria maritima.*

Soft-grass. *Holcus mollis.*

Spear-grass. *Poa compressa.*

Wheat-grass. *Agropyron repens.*

Crested Dog's-tail-grass. *Cynosurus cristatus.*

Crop-grass. *Eleusine indica.* (Crab-grass is probably a corruption of Crop-grass.)

Crowfoot-grass. *Eleusine indica*; *Dactyloctenium ægyptiacum.*

Cuba-grass. *Andropogon halepensis.*

Cuscut. *Andropogon squarrosus.*

Cut-grass. *Leersia oryzoides.*

European. *Leersia oryzoides.*

Rice. *Leersia oryzoides.*

Virginia. *Leersia virginica.*

Dagassa. *Eleusine coracana.*

Dakota Millet. *Setaria italica*; *Panicum miliaceum.*

Darnel. *Lolium temulentum.*

Bearded. *Lolium temulentum.*

Fescue. *Festuca loliacea.*

Deccan-grass. *Panicum frumentaceum.*

Deer-grass. *Epicampes rigens.*

Dennett-grass. *Elymus striatus.*

Desert-grass. Name applied to species of *Blepharidachne.*

Devil's-grass. *Agropyron repens.*

Devil's Darning-needles. *Stipa spartea.*

Knitting-needles. *Stipa spartea.*

Dew-grass. *Agrostis alba.*

Summer. *Agrostis vulgaris.*

Dhaman. *Pennisetum cenchroides.*

Ditch Millet. *Paspalum scrobiculatum.*

Doab, Doorba, Doorva. *Cynodon dactylon.*

Dog or Dog's-grass. *Agropyron repens.*

Dog's Bent. *Agrostis canina.*

Dog's-tail-grass. *Eleusine indica.*

Crested. *Cynosurus cristatus.*

Dog's-tooth-grass. *Cynodon dactylon*; *Eleusine indica.*

Downy Oat-grass. *Avena pubescens.*

Persoon. *Trisetum subspicatum* var. *molle.*

Triple-awn. *Aristida stricta.*

Drooping Reed-grass. *Cinna pendula.*

Drop-seed-grass. Generic name for species of *Sporobolus*. Also applied to species of *Muhlenbergia* (e. g., *Muhlenbergia mexicana*).

Late. *Sporobolus serotinus.*

Rush-like. *Sporobolus junceus.*

Duck-grass. *Poa serotina.*

- Durfa or Durfee-grass.** *Agropyron repens.*
Durra Corn. *Andropogon sorghum.*
Dutch-grass. *Agropyron repens; Eleusine indica.*
Dwarf Meadow-grass. *Poa annua.*
Early Bunch-grass. *Eatonia obtusata.*
 Meadow-grass. *Poa annua.*
 Mesquit. *Buchloë dactyloides.*
 Spring-grass. *Eriochloa punctata.*
 Wild Oat-grass. *Aira præcox.*
East Indian Millet. *Pennisetum spicatum.*
Eaton's-grass. *Eatonia pennsylvanica.*
Egyptian-grass. *Dactyloctenium ægyptiacum; Andropogon halepensis.*
 Millet. *Pennisetum spicatum; Andropogon halepensis.*
English-grass. *Poa pratensis.*
 Bent-grass. *Agrostis alba.*
 Blue-grass. *Festuca elatior.*
 Rye- or Ray-grass. *Lolium perenne.*
Esparto-grass. *Stipa tenacissima; Lygeum spartum.*
European Cut-grass. *Leersia oryzoides.*
Evergreen-grass. *Arrhenatherum elatius; is more rarely applied to Festuca elatior.*
 Millet. *Andropogon halepensis.*
Everlasting-grass. *Eriochloa annulata; E. punctata.*
Fall Marsh-grass. *Spartina cynosuroides.*
 Red-top. *Triodia cupræa (Tricuspis sceleroides).*
False Buffalo-grass. *Munroa squarrosa.*
 Guinea-grass. *Andropogon halepensis.*
 Mesquit. *Buchloë dactyloides.*
 Oat-grass. *Arrhenatherum elatius.*
 Red-top. *Poa serotina.*
 Rice. *Leersia oryzoides.*
Fat-grass. *Melinis minutiflora.*
Feather-grass. Generic name for species of *Stipa*; applied especially to *Stipa pennata*; also *Leptochloa mucronata* and *Holcus lanatus*.
 Bunch-grass. *Stipa viridula.*
Fescue-grass. Generic name for species of *Festuca*.
 Darnel. *Festuca loliacea.*
 Hard. *Festuca duriuscula.*
 Meadow. *Festuca pratensis.*
 Nodding. *Festuca nutans.*
 Red. *Festuca rubra.*
 Sheep's. *Festuca ovina.*
 Small. *Festuca microstachya.*
 Spiked. *Festuca loliacea.*
 Tall. *Festuca elatior.*
 Tall Meadow. *Festuca elatior.*
 Western. *Festuca microstachya.*
 Wild. *Uliola latifolia.*

- Fibrous-rooted Wheat-grass.** *Agropyron caninum*.
- Fine Bent.** *Agrostis vulgaris*.
- Fine-top.** *Agrostis vulgaris*; *A. canina*; *Sporobolus airoides*.
- Salt-grass.** *Sporobolus asperifolius*; *S. airoides*.
- Finger-grass.** *Panicum sanguinale*.
- Hairy.** *Panicum sanguinale*.
- Seaside.** *Chloris petraea*.
- Finger-spiked Beard-grass.** *Andropogon provincialis*.
- Indian-grass.** *Andropogon provincialis*.
- Wood-grass.** *Andropogon provincialis*.
- Fin's-grass.** *Agropyron repens*.
- Florin.** *Agrostis stolonifera*; *A. alba*.
- Flat-stalked or Flat-stemmed grass.** *Poa compressa*.
- Blue-grass.** *Poa compressa*.
- Floating-grass.** *Hydrochloa carolinensis*.
- Foxtail.** *Alopecurus geniculatus*.
- Manna-grass.** *Glyceria fluitans*.
- Fly-away-grass.** *Agrostis scabra*.
- Fly-catch-grass.** *Leersia lenticularis*.
- Fog, Old.** *Danthonia spicata*.
- Fool-hay.** *Panicum capillare*; *Agrostis scabra*.
- Fowl Meadow-grass.** *Glyceria nervata*; *Poa serotina*; *Calamagrostis canadensis*.
- Fox-grass.** *Spartina juncea*.
- Foxtail.** *Setaria glauca*; *Erianthus saccharoides*; *Chloris verticillata*; *Hordeum jubatum*, and species of *Alopecurus*; *Hordeum murinum* (in California).
- Branching.** *Trichloris verticillata*.
- Bristly.** *Setaria verticillata* and *S. germanica*.
- Floating.** *Alopecurus geniculatus*.
- Green.** *Setaria viridis*.
- Large.** *Setaria composita*.
- Meadow.** *Alopecurus pratensis*.
- Slender.** *Alopecurus agrestis*.
- Wild Water.** *Alopecurus aristulatus*.
- Wrinkled.** *Setaria corrugata*.
- Yellow.** *Setaria glauca*.
- French Rye-grass.** *Arrhenatherum elatius*.
- Fresh-water Cord-grass.** *Spartina cynosuroides*.
- Fringed Brome-grass.** *Bromus ciliatus*.
- Fundi or Fundungi.** *Paspalum exile*.
- Furze-top.** *Agrostis vulgaris*; *A. canina*.
- Gama-grass.** *Tripsacum dactyloides*.
- Geranium-grass.** *Andropogon schœnanthus*.
- German Millet.** *Setaria italica*.
- Giant Rye-grass.** *Elymus condensatus*.
- Gietta or Guyetta-grass.** *Hilaria rigida*.
- Gilbert's Relief-grass.** *Phalaris caroliniana*.

Ginger-grass. *Andropogon schenanthus*.

Golden Millet. *Setaria italica* var.

Oat-grass. *Trisetum pratense*.

-top. *Lamarckia aurea*.

Goose-grass. *Elysiue indica*; *Glyceria maritima*; *Panicum texanum*; *Poa annua*.

Grass. Generic name for species of *Bouteloua*. Applied sometimes to *Muhlenbergia texana*, and to other grasses in Arizona and New Mexico.

Black. *Bouteloua oligostachya*; *Muhlenbergia pungens*; *Bouteloua hirsuta*.

Blue. *Bouteloua oligostachya*.

China. *Muhlenbergia pungens*.

Low. *Bouteloua polystachya*.

Tall. *Bouteloua hirsuta*; *B. racemosa*.

White. *Bouteloua oligostachya*, and a species of *Aristida*.

Woolly-jointed. *Bouteloua eriopoda*.

Grapevine Mesquit or Grapevine-grass. *Panicum obtusum*.

Grass of the Andes. *Arrhenatherum elatius*.

Great Bunch-grass. *Festuca scabrella*.

Millet. *Andropogon sorghum*.

Green Foxtail. *Setaria viridis*.

-grass. *Poa pratensis*; *P. trivialis*.

Pigeon-grass. *Setaria viridis*.

Valley-grass. *Andropogon halepensis*.

Guatemala-grass. *Euchloa mexicana*.

Guinea Corn. *Andropogon sorghum cernuus*.

-grass. *Panicum jumentorum*. Erroneously applied to *Andropogon halepensis*.

-grass, Alabama. *Andropogon halepensis*.

-grass, False. *Andropogon halepensis*.

Gumbo-grass. *Agropyron spicatum*.

Guyetta or Gietta-grass. *Sporobolus airoides*; *Hilaria rigida*; *H. jamesii*.

Hair-grass. Generic name for species of *Deschampsia* (Aira.) Applied to *Deschampsia flexuosa*, *Agrostis scabra*, and *Muhlenbergia capillaris*.

Bunch. *Muhlenbergia trichopodes*.

Seaside. *Muhlenbergia capillaris*.

Tufted. *Deschampsia cespitosa*.

Wood. *Deschampsia flexuosa*.

Hairy Finger-grass. *Panicum sanguinale*.

Hairy-flowered Paspalum. *Paspalum dilatatum*.

Muskit. *Bouteloua racemosa*.

Halfa. *Stipa tenacissima*.

Hard Fescue. *Festuca duriuscula*.

-grass. *Stenotaphrum americanum*.

Hare's-grass. *Aristida californica*.

Hare's Tail. *Lagurus ovatus*.

Hassock-grass. *Deschampsia cespitosa*.

Hedgehog-grass. *Asprella hystrix* and *Cenchrus tribuloides*.

Herd's-grass. *Agrostis alba*; *A. vulgaris*; *Phleum pratense*.

- Hog Millet.** *Panicum miliaceum*.
- Holy-grass.** *Hierochloë borealis*.
- Horse Millet.** *Pennisetum (Penicillaria) spicatum*.
- Howell's-grass.** *Calamagrostis howellii*.
- Hungarian Blue-grass.** *Holcus lanatus*.
- Brome-grass.** *Bromus inermis*.
- grass.** *Setaria italica*.
- Indian Corn.** *Zea mays*.
- Couch-grass.** *Cynodon dactylon*.
- grass.** *Andropogon nutans (Sorghum nutans)*; *Andropogon nutans* var. *avenaceus*; and *A. scoparius*.
- Finger-spiked.** *Andropogon provincialis*.
- Oat-like.** *Andropogon nutans*.
- Millet.** *Oryzopsis cuspidata*; *Pennisetum spicatum*; *Andropogon sorghum*; *Setaria italica*.
- Reed.** *Cinna arundinacea*.
- Rice.** *Zizania aquatica*.
- Wheat.** *Panicum ciliatissimum*.
- Italian Millet.** *Setaria italica*.
- Rye-grass.** *Lolium italicum*.
- Ivory Wheat.** *Andropogon sorghum*.
- Japanese Lawn-grass.** *Zoysia pungens*.
- Millet.** *Panicum crus-galli*; *Pennisetum spicatum* and varieties of *Setaria italica* and *Panicum miliaceum*.
- Wheat-grass.** *Brachypodium japonicum*.
- Japan Millet.** *Pennisetum spicatum*.
- Jerusalem Corn.** *Andropogon sorghum* var.
- Job's Tears.** *Coix lachryma*.
- Johnson-grass.** *Andropogon halepensis*.
- Joint-grass.** *Paspalum distichum*.
- June-grass.** *Poa pratensis*; *Koeleria cristata*; *Danthonia spicata*.
- Wild.** *Koeleria cristata*.
- Jungle Rice.** *Panicum colonum*.
- Kafir Corn.** *Andropogon sorghum* variety.
- Kangaroo-grass.** *Anthistirtia ciliata*.
- Kangna.** *Panicum flavidum*.
- Kansas Millet.** *Panicum crus-galli*.
- Kentucky Blue-grass.** *Poa pratensis*.
- Koda.** *Paspalum scrobiculatum*.
- Khushus.** *Andropogon squarrosus*.
- Knot-grass.** *Paspalum distichum*.
- Knot-root-grass.** *Muhlenbergia mexicana*.
- Korakan.** *Eleusine coracana*.
- Large Cane.** *Arundinaria gigantea*.
- Crowfoot-grass.** *Panicum crus-galli*.
- Foxtail.** *Setaria composita*.
- Water-grass.** *Paspalum dilatatum*.
- White-grained Mountain Rice.** *Oryzopsis asperifolia*.

Late Drop-seed-grass. *Sporobolus serotinus*.

Lawn-grass, Japanese. *Zoysia pungens*.

Mexican. *Opizia stolonifera*.

Velvet. *Holcus lanatus*.

Lemon-grass. *Ctenium carolinianum*; *Andropogon citratus*.

Little Blue-stem. *Andropogon scoparius*.

Crab-grass. *Panicum serotinum*.

Lizard-tail-grass. *Manisuris granularis*.

Long-awned Poverty-grass. *Aristida tuberculosa*.

Long-leafed Bent. *Calamovilfa longifolia*.

Louisiana-grass. *Paspalum platycaule*.

Love-grass. *Eragrostis amabilis*.

Low Grama. *Bouteloua polystachya*.

Spear-grass. *Poa annua*.

Lyme-grass. Generic name for species of *Elymus*; applied especially to *E. virginicus*.

Canada. *Elymus canadensis*.

Slender Hairy. *Elymus striatus*.

Upright Sea. *Elymus arenarius*.

Siberian. *Elymus sibiricus*.

Virginian. *Elymus virginicus*.

Maiden Cane. *Panicum curtisii*.

Maize. *Zea mays*.

Mandua. *Eleusine coracana*.

Manitoba Millet. *Panicum miliaceum*.

Manna-grass. Generic name for species of *Glyceria*; applied in Germany to *Panicum sanguinale*.

Common. *Glyceria fluitans*.

Nerved. *Glyceria nervata*.

Pale. *Glyceria pallida*.

Many-flowered Millet-grass. *Oryzopsis multiflora*.

Marram. *Ammophila arundinacea*.

Marsh-grass. *Spartina cynosuroides*; *S. stricta*.

Fall. *Spartina cynosuroides*.

Rough. *Spartina stricta*.

Salt. *Spartina stricta*; *S. juncea*.

Marsh Bent. *Agrostis alba*.

Oat-grass. *Trisetum palustre*.

Mat-grass. *Ammophila arundinacea*; *Rottbællia compressa*.

Maton. *Sporobolus wrightii*.

May-grass. *Poa annua*.

Meadow-grass, Alpine. *Poa laxa*.

Annual. *Poa annua*.

Common. *Poa trivialis*.

Creeping. *Eragrostis reptans*.

Creeping Sea. *Glyceria maritima*.

Dwarf. *Poa annua*.

Early. *Poa annua*.

Meadow-grass, Flat-stalked. *Poa compressa.*Fowl. *Glyceria nervata*; *Poa serotina*; *Calamagrostis canadensis.*Pungent. *Eragrostis major.*Reed. *Glyceria aquatica.*Rough. *Poa trivialis.*Rough-stalked. *Poa trivialis.*Short-stalked. *Eragrostis frankii.*Slender. *Eragrostis pilosa.*Smooth. *Poa pratensis.*Smooth-stalked. *Poa pratensis.*Strong-scented. *Eragrostis minor.*Wavy. *Poa laxa.*Wood. *Poa nemoralis.***Meadow Cat's-tail-grass.** *Phleum pratense.*Comb-grass. *Eragrostis pectinacea.*Fescue. *Festuca pratensis.*Foxtail. *Alopecurus pratensis.*Oat-grass. *Avena pratensis.*Soft-grass. *Holcus lanatus.*Soft-grass, Velvet. *Holcus lanatus.*Spear-grass. *Glyceria nervata.***Mean's-grass.** *Andropogon halepensis.***Mellic-grass.** *Melica nutica.***Meskit-grass.** *Bouteloua hirsuta*; *Buchloë dactyloides.***Mesquit-grass.** Applied generally to species of *Bouteloua* (e. g., *Bouteloua texana*), and to *Aristida purpurea.*Bristly. *Bouteloua hirsuta.*Early. *Buchloë dactyloides.*False. *Buchloë dactyloides.*Grape-vine. *Panicum obtusum.*Running or Creeping. *Hilaria cenchroides.*Velvet. *Holcus lanatus.*Vine. *Panicum obtusum.***Mexican Lawn-grass.** *Opizia stolonifera.*Whisk. *Epicampes macroura.***Mezquit-grass.** Same as Mesquit grass.**Millet, African.** *Pennisetum spicatum.*American. *Setaria italica.*Arabian Evergreen. *Andropogon halepensis.*Cat-tail. *Setaria italica*; *Pennisetum spicatum.*Common. *Panicum miliaceum*; *Pennisetum spicatum*; *Milium effusum.*East Indian. *Pennisetum spicatum.*Egyptian. *Pennisetum spicatum*; *Andropogon sorghum.*Evergreen. *Andropogon halepensis.*German. *Setaria germanica.*Golden. *Setaria italica* var.

Millet, Horse. *Pennisetum spicatum*.

Indian. *Oryzopsis membranacea*; *Andropogon sorghum*; *Pennisetum spicatum*;
Setaria italica.

Japan. *Pennisetum spicatum*.

Many-flowered. *Oryzopsis multiflora*.

Morocco. *Andropogon halepensis*.

Pearl. *Pennisetum spicatum*.

Polish. *Panicum sanguinale*.

Russian. *Panicum miliaceum*.

Seaside. *Paspalum distichum*.

Shanna. *Panicum colonum*.

Sorghum. *Andropogon sorghum* var.

Sprouting. *Panicum proliferum*.

Millet-grass, Wild. *Milium effusum*; *Oryzopsis membranacea*; *Setaria viridis*.

Mission-grass. *Stenotaphrum americanum*.

Missouri Millet. *Setaria italica*.

Mitchell-grass. *Astrebla pectinata*.

Molasses-grass. *Melinis minutiflora*.

Montana Rye. *Triticum polonicum*.

Morocco Millet. *Andropogon halepensis*.

Mountain Oat-grass. *Danthonia compressa*; *D. unispicata*.

Poa. *Poa alpina*.

Red-top. *Agrostis exarata*; *A. canina*.

Rice. Generic name for species of *Oryzopsis*. *O. asperifolia*.

Black-fruited. *Oryzopsis melanocarpa*.

Large White-grained. *Oryzopsis asperifolia*.

Small. *Oryzopsis canadensis*.

Sedge. *Andropogon scoparius*.

Spear-grass. *Poa arida*; *P. alpina*.

Timothy. *Alopecurus occidentalis*; *Phleum alpinum*.

Munro-grass. *Panicum agrostoides*.

Muskit-grass. *Bouteloua racemosa*; *B. hirsuta*; *B. oligostachya*.

Naked Beard-grass. *Gymnopogon racemosus*.

Native Timothy. *Phleum alpinum*.

Needle-and-Thread. *Stipa comata*.

-grass. *Stipa comata*.

Nerved Manna-grass. *Glyceria nervata*.

Nimble Will. *Muhlenbergia diffusa*.

Nit-grass. *Gastridium australe*.

Nodding Fescue. *Festuca nutans*.

Northern Red-top. *Agrostis exarata*.

Oat-grass. *Arrhenatherum elatius*.

Oat-grass, Black. *Stipa avenacea*.

California. *Danthonia californica*.

Downy. *Avena pubescens*.

Early Wild. *Aira præcox*.

Oat-grass, False. *Arrhenatherum elatius.*

Golden. *Avena flavescens.*

Marsh. *Trisetum palustre.*

Meadow. *Avena pratensis.*

Mountain. *Danthonia compressa.*

Purple Wild. *Avena striata.*

Silky-flowered. *Danthonia sericea.*

Spiked Wild. *Danthonia spicata.*

Tall. *Arrhenatherum elatius.*

Tall Meadow. *Arrhenatherum elatius.*

Taller Wild. *Danthonia sericea.*

Tennessee. *Danthonia compressa.*

Wild. *Danthonia; Stipa viridula.*

Yellow. *Trisetum pratense.*

Oat-like Indian-grass. *Andropogon nutans.*

Sorghum. *Andropogon avenaceum.*

Oats. *Avena sativa.*

Australian. *Bromus unioloides.*

Sand. *Avena fatua.*

Seaside. *Uniola paniculata.*

Water. *Zizania aquatica.*

Wild. *Avena fatua; Uniola latifolia; Zizania miliacea; Calamagrostis nuttalliana.*

Old Fog. *Danthonia spicata.*

Witch-grass. *Panicum capillare.*

Orchard-grass. *Dactylis glomerata.*

Orcheston-grass. *Poa trivialis.*

Oregon Rice. *Andropogon sorghum.*

Pale Manna-grass. *Glyceria pallida.*

Pampas Rice. *Andropogon sorghum vulgaris.*

Panic-grass. *Panicum species.*

Bitter. *Panicum amarum.*

Bent-grass. *Panicum agrostoides.*

Para-grass. *Panicum molle.*

Parramatta-grass. *Sporobolus indicus.*

Pearl Millet. *Pennisetum spicatum.*

Perennial Rye-grass. *Lolium perenne.*

Pigeon-grass. *Setaria viridis.*

Green. *Setaria viridis.*

Pine Bunch-grass. *Festuca sp.*

Pifion-grass. *Festuca ovina* variety.

Plume-grass. *Erianthus ravennae; E. saccharoides.*

Poison Rye-grass. *Lolium temulentum.*

Polish Millet. *Panicum sanguinale.*

Pony-grass. *Calamagrostis neglecta.*

Porcupine-grass. *Stipa spartea.*

Poverty-grass. *Aristida dichotoma; A. lanata; Danthonia spicata.*

- Poverty-grass, Long-awned.** *Aristida tuberculosa*.
 Southern. *Sporobolus vaginæflorus*.
 Woolly. *Aristida lanata*.
- Prairie-grass.** *Sporobolus asper*; *S. vaginæflorus*; *Kæleria cristata*; *Eatonia obtusata*.
 Australian. *Bromus unioloides*.
- Prairie Triple-awn.** *Aristida oligantha*.
- Prickle-grass.** *Leersia oryzoides*.
- Pungent Meadow-grass.** *Eragrostis major*.
- Purple Bearded-grass.** *Aristida purpurea*.
 Bent. *Calamovilfa brevipilis*.
 -grass. *Pappophorum wrightii*.
 Heads. *Triraphis mollis*.
 Paspalum. *Paspalum boscoianum*; *P. plicatulum*.
 Sand-grass. *Triplasis purpurea*.
 -top. *Triodia cupræa* (*Tricuspis seslerioides*).
 Wild-oat. *Avena striata*.
 Wood-grass. *Andropogon scoparius*.
- Quack-grass.** *Agropyron spicatum*; *A. repens*; *Distichlis maritima*.
- Quaking-grass.** Generic name for species of *Briza*. *B. media*.
 Tall. *Glyceria canadensis*.
- Quick-grass.** *Agropyron repens*.
- Quitch-grass.** *Agropyron repens*.
- Quivering-grass.** *Oryzopsis membranacea*.
- Ragi Millet.** *Eleusine coracana*.
- Rancheria-grass.** *Elymus arenarius*.
- Randall-grass.** *Festuca pratensis*.
- Range-grass.** *Panicum obtusum*.
- Rat-tail-grass.** *Rottboellia* species.
- Rattlesnake-grass.** *Glyceria canadensis*; *Beckmannia erucaeformis*.
- Ray- or Rye-grass.** *Lolium perenne*.
- Red Fescue.** *Festuca rubra*.
 Millet. *Panicum sanguinale*.
 Salt-grass. *Spartina juncea*.
- Red-top.** *Agrostis vulgaris*; *Calamagrostis canadensis*.
 Fall. *Triodia cupræa*.
 False. *Poa serotina*.
 Mountain. *Agrostis exarata*; *A. canina*.
 Northern. *Agrostis exarata*.
 Panic. *Panicum agrostoides*.
 Tall. *Triodia cupræa*; *Agrostis vulgaris*.
 Wild. *Panicum virgatum*.
- Reed.** *Arundinaria tecta*; *Ammophila arundinacea*; *Zizania aquatica*.
 Bent-grass. *Calamagrostis canadensis*.
 Canadian Small. *Calamagrostis canadensis*.
- Reed-grass.** *Phragmites communis*; *Andropogon nutans*.
 Drooping. *Cinna pendula*.
 Salt. *Spartina polystachya*.

- Reed-grass, Small. *Calamagrostis canadensis*.
 Wood. *Cinna arundinacea*.
- Reed, Canary-grass. *Phalaris arundinacea*; *P. caroliniana*.
 Indian. *Cinna arundinacea*.
 Meadow-grass. *Glyceria aquatica*.
 Sea-sand. *Ammophila arundinacea*.
 Sweet. *Cinna arundinacea*.
- Relief-grass, Gilbert's. *Phalaris caroliniana*.
- Rescue-grass. *Bromus unioloides*.
- Rhode Island Bent. *A. canina*; *Agrostis vulgaris*.
- Ribbon-grass. *Phalaris arundinacea*.
- Rice. *Oryza sativa*.
 Black-fruited Mountain. *Oryzopsis melanocarpa*.
 Cut-grass. *Leersia oryzoides*.
 False. *Leersia oryzoides*.
 -grass. *Leersia oryzoides*.
 Indian. *Zizania aquatica*.
 Jungle. *Panicum colonum*.
 Large White-grained Mountain. *Oryzopsis asperifolia*.
 Mountain. Generic name for species of *Oryzopsis*; *O. asperifolia*.
 Oregon. *Andropogon sorghum*.
 Pampas. *Andropogon sorghum*.
 Small Mountain. *Oryzopsis canadensis*.
 Tuscarora. *Zizania aquatica*.
 Water. *Zizania aquatica*.
 Wild. *Zizania aquatica*.
- River-grass. *Panicum texanum*.
- Rocky Mountain Hair-grass. *Deschampsia cespitosa* var.
- Rolling Spinifex. *Spinifex hirsutus*.
- Rough Bent-grass. *Agrostis scabra*.
 Cook's-foot. *Dactylis glomerata*.
 -leafed Bent-grass. *Agrostis asperifolia*.
 Marsh-grass. *Spartina glabra*.
 Meadow-grass. *Poa trivialis*.
- Roughish Meadow-grass. *Poa trivialis*.
- Rough-stalked Meadow-grass. *Poa trivialis*.
- Running Mesquit. *Hilaria cenchroides*.
- Rosa Oil-grass. *Andropogon schœnanthus*.
- Rush-grass. Generic name for species of *Sporobolus*.
 -like Drop-seed. *Sporobolus junceus*.
 Salt-grass. *Spartina juncea*.
- Russian Millet. *Panicum miliaceum*.
- Rye. *Secale cereale*.
 Montana. *Triticum polonicum*.
- Rye-grass. *Elymus virginicus*; *Lolium perenne*.
 English. *Lolium perenne*.

- Rye-grass, French.** *Arrhenatherum elatius*.
Giant. *Elymus condensatus*.
Italian. *Lolium italicum*.
Perennial. *Lolium perenne*.
Poison. *Lolium temulentum*.
Smooth. *Elymus virginicus*.
Western. *Elymus condensatus*.
Wild. *Elymus canadensis*; *E. condensatus*; *E. triticoides*; *E. virginicus*.
Saccato or Saccatone. *Sporobolus wrightii*; *Muhlenbergia distichophylla*.
St. Augustine-grass. *Stenotaphrum americanum*.
St. Mary's-grass. *Panicum jumentorum*; *Andropogon halepensis*.
Salem-grass. *Holcus lanatus*.
Salt-cedar. *Monanthochloë littoralis*.
-grass. *Sporobolus airoides*; *Distichlis maritima*.
Red. *Spartina juncea*.
Rush. *Spartina juncea*.
Marsh-grass. *Spartina stricta* and *S. juncea*.
Reed-grass. *Spartina polystachya*.
Sand-Bur. *Cenchrus tribuloides*.
-grass. *Triplasis purpurea*; *Oryzopsis membranacea*; *Distichlis maritima*; *Calamovilfa longifolia*; *Andropogon hallii*; *Calamagrostis canadensis*.
Colorado. *Andropogon hallii*.
Oats. *Avena fatua*.
Reed. *Ammophila arundinacea*.
Spur. *Cenchrus tribuloides*.
Satin-grass. *Muhlenbergia glomerata*; *M. mexicana*.
Bearded. *Muhlenbergia sylvatica*.
Heads. *Andropogon erianthoides*.
Schrader's-grass. *Bromus unioloides*.
Scutch-grass. *Cynodon dactylon*; *Agropyron repens*.
Sea Lyme-grass, Upright. *Elymus arvensis*.
Meadow-grass, Creeping. *Glyceria maritima*.
Reed, Common. *Ammophila arundinacea*.
Sea-sand Reed. *Ammophila arundinacea*.
Sea Spear-grass. *Glyceria maritima*.
Seaside Millet. *Paspalum distichum*.
Finger-grass. *Chloris petraea*.
Hair-grass. *Muhlenbergia capillaris*.
Oats. *Uniola paniculata*.
Sedge, Broom. *Andropogon virginicus*.
Creek. *Spartina stricta*.
-grass. *Andropogon virginicus*.
Seneca-grass. *Hierochloë borealis*.
Sennoc. *Lygeum spartum*.
Sesame-grass. *Tripsacum dactyloides*.
Shama Millet. *Panicum colonum*,

Shamalo-grass. *Panicum frumentaceum.*

Sheep's Fescue. *Festuca ovina.*

Shining Spike-grass. *Uniola nitida.*

Short-leaved Beard-grass. *Gymnopogon brevifolius.*

Short-stalked Meadow-grass. *Eragrostis frankii.*

Siberian Lyme-grass. *Elymus sibiricus.*

Side Oats. *Bouteloua racemosa.*

Silk-grass. *Agrostis scabra.*

Silky-flowered Oat-grass. *Danthonia sericea.*

Heads. *Andropogon bombycinus.*

Silver Beard-grass. *Andropogon argyranus; A. saccharoides.*

Tussock. *Poa caespitosa* var.

Simpson's-grass. *Panicum curtisii.*

Six-weeks-grass. *Poa annua.* Name applied in the Southwest to any low, quick-growing annual grass.

Sleepy-grass. *Stipa viridula.*

Slender Cord-grass. *Spartina gracilis.*

Crab-grass. *Panicum filiforme.*

Fescue. *Festuca tenella; Festuca tenuifolia.*

Foxtail. *Alopecurus agrestis.*

Meadow-grass. *Eragrostis pilosa.*

Spike-grass. *Uniola gracilis.*

Tail-grass. *Schedonnardus texanus.*

Slough-grass. *Beckmannia erucaeformis; Spartina cynosuroides.*

Small Cane. *Panicum divaricatum; Arundinaria tecta.*

Fescue. *Festuca microstachya.*

flowered White-grass. *Leersia virginica.*

Mountain Rice. *Oryzopsis canadensis.*

Reed-grass, Canadian. *Calamagrostis canadensis.*

Smaller Blue-grass. *Poa compressa.*

Smooth Brome-grass. *Bromus racemosus; B. inermis.*

Chloris. *Chloris glauca.*

Marsh-grass. *Spartina alterniflora.*

Meadow-grass. *Poa pratensis.*

Paspalum. *Paspalum lute.*

Rye-grass. *Elymus virginicus.*

-stalked Meadow-grass. *Poa pratensis.*

Smut-grass. *Sporobolus indicus.*

Snow-grass. *Danthonia flavescens.*

Soft Brome-grass. *Bromus mollis.*

Chess. *Bromus mollis.*

-grass, Creeping. *Holcus mollis.*

Meadow. *Holcus lanatus.*

Woolly. *Holcus lanatus.*

Sea Lyme-grass. *Elymus mollis.*

Sorghum Millet. *Andropogon sorghum* var.

Southern Bent-grass. *Agrostis elata*.

Canary-grass. *Phalaris caroliniana*.

Eragrostis. *Eragrostis purshii*.

Poverty-grass. *Sporobolus vaginiflorus*.

Spear-grass. *Eragrostis purshii*; *Poa flenosa*.

Spanish-grass. *Panicum molle*.

Spear-grass. *Poa annua*; *P. pratensis*; *Triodia trinerriglumis*; *Stipa spartea*.

Branching. *Eragrostis tenuis*.

Bunch. *Poa andina*.

Creeping. *Poa compressa*.

Creeping Sea. *Glyceria maritima*.

Low. *Poa annua*.

Meadow. *Glyceria nerrata*.

Mountain. *Poa arida*.

Sea. *Glyceria maritima*.

Southern. *Poa flenosa*; *Eragrostis purshii*.

White. *Glyceria aquatica*.

Wood. *Poa alsodes*.

Spider Bent-grass. *Agrostis arachnoides*.

Spike-grass. Generic name for species of *Uniola*. *Uniola paniculata*; *Diplachne fascicularis*; *Distichlis maritima*.

• **Shining.** *Uniola nitida*.

Slender. *Uniola gracilis*.

Spiked Fescue. *Festuca loliacea*.

Wild Oat-grass. *Danthonia spicata*.

Spring-grass, Sweet-scented. *Anthoranthum odoratum*.

Rolling-grass. *Spinifer hirsutus*.

Sprouting Crab-grass. *Panicum proliferum*.

Millet *Panicum proliferum*.

Squirrel-grass. *Hordeum murinum*.

Squirrel-tail-grass. *Hordeum jubatum*; *H. pratense*.

Stewart's Canary-grass. *Phalaris caroliniana*.

Stink-grass. *Eragrostis minor*; *E. major*.

Strong-scented Meadow-grass. *Eragrostis minor*.

Sporobolus. *Sporobolus heterolepis*.

Suffolk-grass. *Poa annua*.

Sugar Cane. *Andropogon sorghum*.

African. *Andropogon sorghum*.

Chinese. *Andropogon sorghum*.

Sugar-grass. *Pollinia fulva*.

Summer Dew-grass. *Agrostis vulgaris*.

Swamp Chess. *Bromus ciliatus*.

Millet. *Isachne australis*.

Wire-grass. *Poa serotina*.

Sweet-grass. *Hierochloë borealis*.

-scented-grass. *Anthoranthum odoratum*.

Sweet-scented Spring-grass. *Anthoxanthum odoratum.*

Vernal-grass. *Anthoxanthum odoratum.*

Reed. *Cinna arundinacea.*

Sorghum. *Sorghum saccharatum.*

Vernal-grass. *Anthoxanthum odoratum.*

Switch-grass. *Panicum virgatum.*

Syrian-grass. *Andropogon halepensis.*

Tail-grass, Slender. *Schedonnardus teranus.*

Tall Fescue. *Festuca elatior.*

Grama. *Bouteloua hirsuta.*

Oat-grass. *Arrhenatherum elatius; Anthistiria arenacea.*

Quaking-grass *Glyceria canadensis.*

Red-top. *Triodia cupressa; Agrostis vulgaris.*

Sheep's Fescue. *Festuca durinacula.*

Smooth, Panic-grass. *Panicum virgatum.*

Thin-grass. *Agrostis elata.*

Taller Wild-grass. *Danthonia sericea.*

Tame Timothy. *Phleum pratense.*

Tear-grass. *Coix lacryma.*

Teff. *Eragrostis abyssinica.*

Tennessee Oat-grass. *Danthonia compressa.*

Teosinte. *Euchlana mexicana.*

Terrell-grass. *Elymus virginicus and E. canadensis.*

Texan Blue-grass. *Poa arachnifera.*

Crab-grass. *Schedonnardus teranus.*

Texas Millet. *Panicum teranum.*

Thatch-grass. *Spartina cynosuroides; S. stricta.*

Thin-grass. *Agrostis perennans.*

Tall. *Agrostis elata.*

Tickle-grass. *Agrostis scabra.*

Tiger-grass. *Thysanotana acarifera.*

Timothy. *Phleum pratense.*

Californian. *Phalaris angusta.*

Mountain. *Alopecurus occidentalis.*

Native. *Phleum alpinum.*

Tame. *Phleum pratense.*

White. *Holcus lanatus.*

Wild. *Muhlenbergia glomerata; Beckmannia cruciformis; Setaria viridis.*

Toothache-grass. *Ctenium americanum.*

Triple-awned-grass. Generic name for species of *Aristida.*

Tuft-grass, White. *Triodia acuminata.*

Tufted Hair-grass. *Deschampsia cespitosa.*

Turkey-foot-grass. *Andropogon hallii; A. provincialis.*

Turkish Millet. *Andropogon sorghum.*

Tuscarora Rice. *Zizania aquatica and Z. miliacea.*

Tussock-grass. *Poa flabellata; Sporobolus indicus.*

- Twin-grass.** *Diarrhena americana.*
- Twisted Beard-grass.** *Andropogon contortus.*
- Twitch-grass.** *Agropyron repens.*
- Upright Chess.** *Bromus racemosus.*
- Sea-lyme-grass.** *Elymus arenarius.*
- Usar-grass.** *Sporobolus orientalis.*
- Valley-grass, Green.** *Andropogon halepensis.*
- Varilla-grass.** *Hierochloë borealis.*
- Various-leafed Fescue.** *Festuca heterophylla.*
- Velvet-grass.** *Holcus lanatus.*
- Lawn-grass.** *Holcus lanatus.*
- Meadow-grass, Soft.** *Holcus lanatus.*
- Mesquit.** *Holcus lanatus.*
- Vernal-grass.** *Anthoxanthum odoratum.*
- Sweet.** *Anthoxanthum odoratum.*
- Vetivert.** *Andropogon squarrosus.*
- Vine Mesquit.** *Panicum obtusum.*
- Virginia Beard-grass.** *Andropogon virginicus.*
- Cut-grass.** *Leersia virginica.*
- Lyme-grass.** *Elymus virginicus.*
- Vitivert.** *Andropogon squarrosus.*
- Wallaby-grass.** *Danthonia semiannularis.*
- Water Couch-grass.** *Paspalum distichum.*
- Water Foxtail** *Alopecurus geniculatus.*
- Wild.** *Alopecurus aristulatus.*
- Water-grass.** *Panicum crus-galli.*
- Meadow-grass.** *Glyceria aquatica.*
- Oats.** *Zizania aquatica; Uniola paniculata.*
- Rice.** *Zizania aquatica.*
- Wavy Meadow-grass.** *Poa lara.*
- Western Beard-grass.** *Aristida purpurea.*
- Brome-grass.** *Bromus pumpeilianus.*
- Fescue.** *Festuca microstachya.*
- June-grass.** *Kaleria cristata.*
- Rye-grass.** *Elymus condensatus.*
- Wheat.** *Triticum sativum.*
- grass.** Generic name for species of *Agropyron*: *A. spicatum.*
- grass, Awned.** *Agropyron caninum.*
- Bearded.** *Agropyron caninum.*
- Creeping.** *Agropyron repens.*
- Fibrous-rooted.** *Agropyron caninum.*
- Japanese.** *Brachypodium japonicum.*
- Wiry.** *Agropyron divergens.*
- Chinese.** *Andropogon sorghum.*
- Ivory.** *Andropogon sorghum vulgaris.*
- Wild.** *Elymus triticoides.*

Wheat, Wild-goose. *Triticum polonicum*.

White Alfillaria. *Munroa squarrosa*.

Bent. *Agrostis alba*; *Andropogon scoparius*.

Egyptian Corn. *Andropogon sorghum cernuus*.

Gramma. *Bouteloua oligostachya*.

-grass. *Leersia oryzoides*; *L. virginica*.

Small-flowered. *Leersia virginica*.

Rush. *Spartina juncea*.

Spear-grass. *Glyceria aquatica*.

Timothy. *Holcus lanatus*.

Top. *Danthonia spicata*; *Agrostis alba*.

Tuft-grass. *Triodia acuminata*.

Yorkshire. *Holcus lanatus*.

Wild Barley. *Hordeum pratense*.

Chess. *Bromus kalmii*.

Pescue-grass. *Uniola latifolia*.

-goose Wheat. *Triticum polonicum*.

June-grass. *Koeleria cristata*.

Millet-grass. *Milium effusum*; *Oryzopsis membranacea*; *Setaria viridis*.

Oat-grass, Purple. *Avena striata*.

Oat-grass or Oat-grass. Species of *Danthonia*; *Andropogon nutans*; *Arrhenatherum elatius*; *Stipa viridula*.

Oats. *Avena fatua*; *Uniola latifolia*; *Zizania latifolia*; *Calamagrostis nuttalliana*.

Quack-grass. *Agropyron spicatum*.

Red-top. *Panicum virgatum*.

Rice. *Panicum colonum*; *Zizania aquatica*.

Rye. *Elymus virginicus*; *E. triticoides*; *E. condensatus*.

Timothy. *Muhlenbergia glomerata*; *Setaria viridis*; *Beckmannia erucaeformis*.

Water Foxtail. *Alopecurus aristulatus*.

Wheat. *Elymus triticoides*.

Willard's Brome-grass. *Bromus secalinus*.

Wire-grass. *Muhlenbergia diffusa*; *Poa compressa*; *Sporobolus junceus*; *Aristida stricta*; *Cynodon dactylon*; *Eleusine indica*; *Andropogon scoparius*; *Sporobolus heterolepis*; *Schedonnardus teranus*. Also applied to *Juncus* species.

Swamp. *Poa serotina*.

Bunch-grass. *Agropyron divergens*.

Wiry Wheat-grass. *Agropyron divergens*.

Witch-grass. *Agropyron repens*.

Old. *Panicum capillare*.

Wood-grass. *Sorghum nutans*; *Muhlenbergia mexicana*.

Finger-spiked. *Andropogon provincialis*.

Purple. *Andropogon scoparius*.

Wood Hair-grass. *Deschampsia flexuosa*.

Meadow-grass. *Poa memorialis*.

Reed-grass. *Cinna arundinacea*.

Spear-grass. *Poa alsodes*.

- Woolly Beard-grass.** *Erianthus saccharoides*.
Bent-grass. *Calamovilfa longifolia*.
-jointed Grama. *Bouteloua eriopoda*.
Poverty-grass. *Aristida lanata*.
Soft-grass. *Holcus lanatus*.
Triple-awn. *Aristida lanata*.
Yard-grass. *Eleusine indica*.
Yellow Foxtail. *Setaria glauca*.
Oat-grass. *Trisetum flavescens*.
Tussock. *Danthonia flavescens*.
Yerba de Para. *Panicum molle*.
Yorkshire Fog. *Holcus lanatus*.
White. *Holcus lanatus*.
Zacate de liebre. *Aristida californica*.
grass. *Sporobolus wrightii*.
Zacatone. *Sporobolus wrightii*.

○

UNIVERSITY OF MICHIGAN



3 9015 06383 6996

E 00 114

DEC 8 1982

UNIV. OF MICH.
LIBRARY

